THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., AUGUST 14, 1890.

THE WEEK IN IRON CIRCLES.

General Features. A feature of importance to the iron interest at the moment is the heavy melting of pig iron by various industrial plants throughout the country. Car shops and pipe works are active, stove founders and implement makers are well employed, rolling mills are busy, and in not a few instances founders refusing new business, having already a full quota of orders, and experiencing much difficulty in obtaining the services of molders. An active demand has been experienced for mill iron, grey forge and mottled recently, and a fair run of small orders for foundry grades, but there has been less movement of softeners and of car wheel irons. Considerable annoyance has arisen from the delay of iron in transit between the furnaces and the consumers' yards. As a rule prices of Southern iron have been very steady and Northern brands have been well sustained. Recent rains in the Central West have relieved the drought that threatened a serious curtailment of the corn crop, and a better feeling now prevails. The week just closed has been a quiet one in the Chicago iron market. The amount of new business booked has been small and the demand for pig metal at present is light, as a large portion of the trade have covered their entire needs for the coming season's requirements. Continued firmness exists as to prices, both on Northern and Southern brands. For the most part the foundries and machine shops of the Chicago district have a good stock of orders on hand, and the outlook is favorable for continued activity. We have to report another quiet week for St. Louis, with few and unimportant sales effected, at unchanged prices. Whilst deliveries of iron, on contracts, are quite active, in consonance with the heavy consumption, inquiries are limited, and are somewhat discouraged by the scarcity of certain grades, and the prices asked for them. It is no longer doubtful that the leading Southern furnaces are well sold ahead, and the stolid strength theydisplay is a marked feature in the situation. Charcoal irons and Ohio softeners are moving slowly at about previous values. There is a fair amount of business at Louisville, the Fall buying noted in last week's report continuing. Prices are firm, but there has been no advance, and it is thought that business will continue during the balance of the year, with but little fluctuation in prices. The unsatisfactory condition of crops in the South is affecting the agricultural companies, and in some instances they are compelled to carry over their finished product, so that their trade can be of no assistance to the market. Consumption continues very heavy, and outside of the agricultural companies, no slacking of orders is perceptible, and mills report that they are crowded with work. There are several new Southern furnaces going in blast during the coming month. These have expected for a long time to be making iron, and are now probably ready to run. At Detroit there has been considerable activity during the week under review. Inquiries have been more numerous, and have not been confined to any one particular grade of iron or to any particular class of trade. Several sales of considerable magnitude have been made in the Detroit market. Southern irons have been most active, with Lake Superior charcoal a good second. Silvery irons are in better demand and consumers are asking that shipments on orders already placed be hurried forward. The general tone of the market at Buffalo remains about the same as reported for the past two weeks. The prices are still firm with slight concessions on silvery grades only. The inability to get Southern iron and the delayed shipments from that district has a marked influence on sales. The extraordinary expansion of the iron and steel making capacity of the country, under some circumstances, might occasion distrust in the trade; but there seems to be no apprehension among those who have their millions invested in this industry, as to an excess in production, or as to the future course of prices. Mills are being enlarged, new mills are under construction or projected; a great many new furnaces are being hurried to completion; machinery is being increased in capacity, and improved, and everything possible is being done to increase production and lessen cost, and all this despite the fact that railroad requirements are at a minimun, excepting for equipments. Nearly all of the railroad companies are liberal buyers of equipments and supplies, and the rail mills of the country are kept running full time on orders for rails, billets and other products. The car and locomotive works are all oversold. Some interest may be taken in the condition of the pig iron warrant yards of this country. Prior to October 1, 1889, the net stock in the yards was 7,200 tons. During October it advanced to 11,900 tons; December 1, it was 24,600 tons; January 1, 35,100 tons; February 1, 41,000 tons; March 1, 48,500 tons; April 1, 54,500 tons; May 1, 59,700 tons; June 1, 61,100 tons; July 1, 66,600 tons, and August 11, 68,800 tons. Compared with the daily consumption of the country this aggregate is insignificant and can play no part in the course of the iron market. The structural and plate iron mills of the country are running full with excellent prospects for the rest of the year.

Iron Ore. The delay foreshadowed last week in connection with the locking up of the "Soo" is telling severely upon the trade, and in every feature of the business. The release of the two imprisoned fleets has brought about a bunching of vessel craft at both ends of the chain of lakes, and while this abnormal condition of affairs cannot, of course, last very long, its damaging influence will be felt, more or less, all through the remainder of the season. The docks in this vicinity are fairly jammed with ore, all of which has been sold, and the railways are vainly devising means to take care of this material, so that there isn't a ghost of a chance of storing a pound of ore that hasn't already found a market. The situation cannot by any means be called cheerful in any respect, and the oldest and most experienced heads in the business are unable to make an intelligent forecast of what the future has in store for the ore trade.

Pig Iron. Very little change has taken place in the conditions governing the market since our last report, and the indications point to a firm if quiet market, at least until the beginning of September. That iron is going to be higher in a short time, is a commonly accepted fact, but consumers do not on that account seem to place heavier orders than their daily wants require—preferring, perhaps, to pay the market price when the advance does come. Figures compiled by the Western Pig Iron Association indicate that the present stocks of raw material amount to less than 4 per cent. of the annual output, and in the immediate vicinity of this market there is certainly no overplus of iron.

Merchant Iron. There is great demand for bar iron, for use in the general hardware and jobbing trades. The price at the mills is $1.75, making the local price, out of store, about $1.90. Sheets are a trifle firmer, heavy sheets and plate going better, however, than the higher numbers. No. 24 sells at $2.90, others in the same ratio. The bulk of the mills have started up again, and are running day and night to fill a multitude of orders.

Hardware. Jobbers report a good trade in all the lines. Cut nails, selling at $1.85 at the mill, are held here at $2. Gas pipe is in demand and the stocks are largely broken. The discount runs on the basis of 47½ for small black. Metals are fairly firm, promising an advance.

OUR IMPORTS OF IRON AND STEEL.

According to the summary statement of the imports of the United States for the twelve months ending June 30, 1890, iron and steel, and the manufactures thereof, cut the following figure:

This year we imported 1,157,395 tons of iron ore, valued at $2,415,714, as against 652,032 tons, valued at $1,507,658 last year, an increase in tonnage of 43 per cent., and in valuation of a little less than 40 per cent. This does not look as if there were any justification in reducing the duty on iron ore, as proposed in the Senate, but defeated.

Our imports of pig iron show a slight falling off. This year we imported 146,772 tons; last year, 176,727 tons. The value this year was $3,682,687; last year, $2,860,462.

Scrap iron shows no perceptible change.

Bar iron imports dropped from 69,280,491 pounds last year to 64,031,938 pounds this year.

Perhaps the most remarkable falling off in imports is that of steel rails. Last year we imported 24,257 tons, valued at $581,109; this year we only took 236 tons, valued at $5,538, or one-tenth of the tonnage and value of the previous year.

Of cotton ties we imported this year 37 per cent. less than last. The figures are: 1890, 44,621,533 pounds; 1889, 71,654,638 pounds.

Steel hoops, bands, strips and plates show a falling off of 61 per cent., dropping from 46,736,057 pounds, last year, to 18,702,580 pounds this year.

Fifty-seven per cent represents the decrease in imports of steel ingots, slabs, billets, etc., this year over last. Here are the figures: 1890, 81,395,033 pounds; 1889, 215,631,109 pounds. The valuation was cut down $1,000,000.

There was a trifle more of sheet, plate and taggers' iron imported over the previous year; a decrease in wire rods; an increase in wire, wire rope, etc., and a decrease in chains.

Though there was a decrease in the imports of tinplates the aggregate still remains enormously large. The figures themselves tell the story:

	1890.	1889.
Pounds	679,838,625	735,779,988
Value	$20,921,220	$21,222,653

The total value of all imports of iron and steel for the fiscal year of 1890 was $41,637,241; for the fiscal year of 1889, $42,377,793.

THE COST OF STEEL RAILS.

Much comfort has been taken by "Tariff Reform" journals in the recent report of Commissioner of Labor Wright, regarding the cost of steel rails. The published figures were so misleading, in some respects, that Mr. James M. Swank has written a reply to United States Senator Aldrich, in which he claims:

First. That according to Mr. Wright's own statement, his figures omit some very essential elements in the cost, namely, interest, insurance, depreciation of plant and freight charges to point of delivery. These omissions are really vital in estimating the value of these statistics.

Second. While all of the details are included in the statistics of the English works, taxes and office salaries are not included in the American figures, while, aside from the pay-roll, the various other costs are estimated. Actual figures are one thing; estimates are another.

Third. It is shown by Mr. Swank that, as a matter of fact, the American and the English mills are not comparable, for the reason that the former are fast-running and the latter slow-running. The cost of production at the American works is, therefore, made to appear relatively too low as compared with the English works, and for obvious reasons.

Fourth. Mr. Wright takes no account of the fact that one of the English mills compared produces "light" rails, whereas both of the American mills produce "standard" rails, when the truth is, that the production of "light" rails requires more labor than that of "standard" rails.

Fifth. But, even if it were certain that the figures given by Mr. Wright show a fair average of the cost of producing steel rails in this country and Europe, Mr. Swank shows that the effect on our markets of the proposed duty of $11.20 per ton would be disastrous. The average of the cost at the two American works for "standard" rails is shown by his figures to be $26.24, while the only British cost given for "standard" rails is $18.58. The British manufacturer, according to Mr. Wright, has therefore an advantage of $7.66 to start with. The freight on his rails to New Orleans, Galveston, and other ports in the South and Southwest does not usually exceed 10 shillings, or $2.50 per ton, to which may be added 50 cents for incidental transportation charges; whereas, the freight on American rails to the same ports is never less than $5, and is often as high as $8 and $10 per ton. Accepting $7.50 as a fair average of American freight rates to the ports mentioned, the British manufacturer has an advantage in freight of $4.50 per ton, which, added to his original advantage of $7.66, makes a total advantage of $12.16, a larger sum than the proposed duty of $11.20 per ton.

The difference in the cost of delivering steel rails at ports in the South and Southwest, in which sections the greatest activity in American railroad building now prevails, is thus seen to be in favor of the British manufacturer if the proposed duty of $11.20 is adopted. Any advance *over* the present cost of producing steel rails in the United States, however slight or from whatever cause, would practically exclude our rails from the markets referred to.

IS THERE AN AMERICAN CORNER IN SCOTCH PIG?

The *Iron and Coal Trades Review*, of London, thinks it has discovered an American "corner" in Scotch pig iron. It locates the "corner" in New York and pronounces it a risky venture, and almost incredible. Why it is almost incredible, the *Review* explains, is because of the well-known fact that the demand for Scotch iron by American founders has been declining for years past, and will probably disappear altogether before very long.

One of the chief reasons for forming the "corner" is understood to be the large and steady decline in the stocks at Messrs. Connal's yards, the shrinkage during the past seven months amounting to no less than 241,475 tons. It would, however, says the *Review*, be very unwise for any "cornering" party to assume that this movement is likely to go on indefinitely; on the contrary it is certain that the depletion will receive a rude check if no substantial improvement should speedily occur in the iron trade, and the addition of a few thousand tons to the stocks in the public stores would soon shatter a combination. Another inducement which is said to have weighed with the "corner" men in the promotion of their scheme is the increased cost of importing the Scotch pig, for we are told that "steamers, instead of bringing over iron freight free, as ballast, now ask 2s. 6d. for freight." This consideration is doubtless an important one, but, as in the case of stocks, it is impossible, claims the *Review*, to calculate with any degree of certainty on a permanent improvement in the freight market, and any fresh depression in freights will infallibly shiver the "corner" to atoms.

But the last reason adduced by our English contemporary is undoubtedly the chief one, viz.; "that any attempt to force up the price of Scotch iron in the United States would prevent those founders—now a gradually declining number—who still continue its use from buying this class of iron; and we know perfectly well that there would be no serious difficulty in providing native substitutes for the few Scotch brands now imported for foundry purposes into that country."

There is no doubt that the London paper has struck the keynote in the latter fact. "American Scotch" has long proven itself so well adapted to the uses of American founders, that they are even now practically independent of the Scotch makers.

In the meantime, we observe that, although the prices which have been quoted for some time for Scotch pig iron still prevail at New York, and are firmly maintained, the business in this iron is almost at a standstill. The transactions for the past week foot up about 350 tons. No. 1 Coltness is quoted at $23.50; Dalmellington, $20.50; Eglinton, $19.25.

The Iron Trade Review asks: "Which way will the Senate tariff cat jump?" As the overprotected interests, the iron mills chief among them, have been skimming the cream off the country so industriously for years, the feline will probably take his accustomed leap. When he gets his head well down into the neck of the pitcher, it is to be hoped some modern David will come along and knock out his nine lives with a tariff reform club.—[American Artisan.

A very candid, though unconscious, admission by our Free Trade friend that the McKinley bill will probably pass.—[Iron Trade Review.

Admitted, for while to conform to the canons which should govern the discussion of polemical subjects even in newspaper columns we might modify its pungency somewhat, we do not assume to question the fundamental truth paradoxically expressed in a proverb which places no limit upon the possession of honor.—[American Artisan.

The pungency of the above paragraph is only equalled by its paradoxicality.

CLOSER figures as to the effect upon lake commerce of the break in the Sault Ste. Marie Canal lock, show that the total number of vessels delayed from the time of the break at 4 o'clock P. M. of Thursday, July 31, until 9 o'clock A. M. on Thursday, August 7, when the

lost time was fully made up, is 265. The lock was impassable for just 88 hours. The total cargo of the 265 delayed vessels amounted to 208,484 tons, and the number of passengers delayed is 1,362, of which 1,302 were tourists, and 60 local. The greatest number of vessels locked through during any twenty-four hours is 92. The average time for which the total of 265 vessels were delayed is one day, sixteen hours and thirty-two minutes. The loss to vessel owners alone will be $80,000 per day. Of course when the loss to the country in general is figured it amounts to something over $300,000 per day. Can Congress longer withhold the aid necessary to avert such disasters in the future?

THE *American Artisan*, confronted by the fact that its position on the tinplate question is identical with that of English manufacturers, says it can't help that; but it doesn't deny that, holding this identical position, it puts itself in in the class depended upon by the British interests to "exercise their powers against the [McKinley] bill." It appears to be doing the bidding of its British masters exceedingly well —[Iron Trade Review.

From our esteemed contemporary's point of view we are in good company. Nobody, we believe, has questioned the stalwart Americanism of Messrs. Blaine and Plumb.—[American Artisan.

We are not aware that Messrs. Blaine and Plumb are opposing the building up of a tinplate industry in this country.

LABOR COST OF RAILS.

The Senators in Congress do not know everything under the sun; as for instance, Senator George does not, or rather he did not before having been set right August 2, know the cost of labor in a ton of steel rails. He said in his speech on the tariff bill that the labor cost was $1 54 out of the $24, and though he got these figures from the report of the chief of the bureau of labor, yet he misapplied them, hence went so dead wrong that other Senators were enabled to correct him with some intimation of sarcasm in their kindness. Senator George made the mistake of taking the full cost of a ton of rails and only the labor on the advancement of pig iron to rails. If he had delved deeper into Chief Wright's statistics, or had less unfamiliarity with metal manufacturing, he would have figured thus: Cost of material in one ton of rails, $21.02; cost of finished rails, $24.79; difference, $3 77; labor in making this difference (not including managers and clerks hire) $1.54. If the labor in getting out the raw materials and their conversion into pig is taken into consideration, Senator Platt, who answered Senator George, was not so far wrong in the assertion that the labor on a ton of rails was ten times the amount stated by the latter, say $15 on a production of a ton of rails, the cost of which was $24. We have not the data for an exact calculation as to this, but are inclined to the opinion that Senator George overshot the mark by a few dollars. When we receive Chief Wright's full report we shall be enabled to resume this point with figures that will be accepted on all hands as reliable; but until then we can only "guess" that the labor does not exceed $10.

If the Senate had a Bessemer steel worker in it, more than likely he would have argued on somewhat different lines than that followed by Senator George. He would have taken cost of material and of labor, and then given price of rails at mill, thus comparing the cost of labor with the difference between the cost of the rails and the amount per ton at which sold, with the result to show what the labor of the steel mill gets and what the capital gets. We already know that labor gets $1.54. If $33 is a fair average selling price for the past year, capital got the difference between that and $24.79, which is the cost of production, or $8.21 per ton. However one may look at the debate of Saturday, the conclusion must be reached that none of the Senators appeared to be well posted. Senator George was not informed at all on his subject, else he would either have adopted the line we have marked out, or have made a comparison with the English labor cost. This latter is $2.55 to the ton, or $1.01 more than the American labor cost.—[National Labor Tribune.

New Water Pipe.

A new kind of water pipe which has recently been upon the European market is described in a German journal. The pipes are made of glass about 0.2 inch thick, and have an asphalt coating about 0.4 inch thick, with fine gravel on the outside. The purpose of the asphalt coating is to prevent fracture of the pipes. The latter are designed to supplant wooden, earthenware or cement pipes, and also lead and iron service pipes, the advantages claimed for them being thorough resistance against the moisture in the ground, and against the action of acids and alkalies. They are, moreover, impervious to gases, and are claimed to afford little opportunity to the formation of incrustations. What results they will give in practice remain to be determined.

A New Tin Island in East India.

The Singkep Tin Co., of the Island of Singkep, has increased its capital to £125,000—to insure the regular working of tin mines. Singkep promises to become a formidable rival to its great tin-producing neighbors, Banca and Blitong. Its size is about 123,550 acres, and it belongs to the Lingoa Islands, a group off the east coast of Sumatra, and formerly belonging to Johore and Malacca. The tin mines of Singkep are supposed to be of great antiquity. They were hitherto worked by the native Sultan, who is a vassal of Holland. He exported the ore to Muntok, the capital of Banca, or to Singapore, but Singkep tin was not known by itself in the European market, being sold for Banca or Blitong.

NOVEL NAIL-MAKING MACHINE.

Some very interesting—and at the same time, in their result, very important—trials in connection with the manufacture of wire nails, were conducted at the American Iron Works, the other day. These were nothing else than the making of wire nails on an ordinary plate nail machine, a thing that has hitherto been regarded as impossible. But nothing is impossible to the inventive genius of the American mechanic, and the trials, successfully conducted, were owing to the creative faculty of a mechanic, whose name for the present must remain unannounced.

Through the courtesy of General Manager C. Shively, a representative of the *Dispatch* was permitted to inspect the process. One of the long row of nail plate machines out of scores now standing idle had been fitted with the new arrangement. The self-feeder had been removed, and in its place was substituted an ordinary wire nail machine feeder, operating from the left side. The bedplate, griping and heading dies remained as in the old machine, but from the clamp at the back had been attached an arrangement for cutting and pointing the wire, similar to the manner in which this process is done in regular wire nail machines. These were, in most, the extent of the alterations on the old machines.

The power was put on, and the machine began to turn out perfectly formed wire nails, at the rate of 250 a minute. In was claimed for the device that the heading die performed its work better than that of the regular wire nail machine. The heading arrangement of the latter works firm above, and fashions the head with a quick blow. The heading die of the transformed nail-plate machine works from the right-hand side, and works the head with a more gradual motion.

A handful of nails examined seemed to be thoroughly well-made, well-pointed, and with head large, and without any indication of splitting. The nails were of the eight-penny size, but by changing the space block, 4, 6, and 10-penny sizes can be made.

The time necessary to transform a plate nail machine into a wire nail machine is short half an hour. The product of the improved plate nail machine is stated to be from 200 to 250 a minute, against 160 nails to the minute turned out by the regular wire nail machine.

The trials referred to were made under the direction of Mr. H. R. Beam, of Chicago, who has been engaged for the last month in bringing the arrangements to perfection.

Mr. Beam, though not the original inventor of the device, holds the patents. He said the other day that he was indebted to Messrs. Jones & Laughlins for the privilege of trying the new arrangements on one of their machines. It had taken him a month to bring his plans into successful operation, but he now felt assured that the device for making wire nails on plate nail machines was thoroughly successful. He had most difficulty, he said, in fashioning the head, not being a practical nailmaker, and he was indebted to Mr. Hunter, of the department, for helping them out.

"It has taken a year and a half," said Mr. Beam, "to bring this invention into practical operation, but I am now satisfied that I hold a very important invention. Any plate-nail machine can be converted into a wire-nail machine in a very short time and at a very small cost. It has been held impracticable to adopt the old machines to the manufacture of wire nails, but I am prepared to convince the skeptical that it is no longer so."

The importance of this innovation in nail making can hardly be over-estimated. It is stated that there at least 7,000 plate nail machines idle to-day throughout the country, owing to the inability of the manufacturers to make anything out of plate nails at present prices. The Wheeling manufacturers, by refusing to sign a scale, have practically obtained control of the business, and makers here and elsewhere have gone out of the business because there was no money in it for them. The plants are idle, and the amount of capital invested in them lying dormant.

Under the patents controlled by Mr. Beam, every nail machine in the country can once more go into full operation and obtain a share of the increasing demand for wire nails, nails which are gradually beating the cut nail out of the market.

Another effect which will likely result from an extended use of this arrangement is the destruction of the plans of the wire nail trust promoters. Readers will remember the efforts made to combine interests in this product last year, and the non-success that ensued through manufacturers failing to harmonize on the point.

The report that Messrs. Jones & Laughlins were adding an extensive wire nail plant to their works was probably due to Mr. Beam's efforts to transform the plate nail machines. The firm does not know what it will do in the matter. The trials were made by Mr. Beam, altogether on his own account and independently of the firm. He has not made any arrangements with Jones & Laughlins to adopt his improvements.—[Pittsburgh Dispatch.

A correspondent of *The Iron Trade Review* writes: "I saw Mr. Beam this morning, and he said that his intention was to place the right to use the invention on the market as soon as he had it completed. He informs me that the cost of changing an ordinary nail machine into a wire nail machine will not exceed $100.00, and that when his improvement is put onto the plate nail machine it does not interfere in any way with the working parts of the machine, so that by loosening a couple of bolts the attachment can be taken off and cut nails made as before, thus giving the machine the capacity for manufacturing either kind of nails.

AN interesting event took place on the Clyde the other day in the launching of a Japanese steel-plated war vessel. She is 300 feet in length by 42 feet in breadth and 24 feet in depth. Her tonnage is 2,450; she has twin screws and three masts with military tops. She carries twenty-seven guns and three torpedoes, and is manned by a crew of 300. Viscountess Kewase christened the ship the Chiyoda.

LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

V.—LORAIN.

The mouth of Black River began to assume importance as a point of shipment in 1830, because of the absence of either canals or railroads; the river affording the only means for exporting the large products of the surrounding country. At times this trade, tributary to this early lake port, reached as far inland as Medina county. Before the railroad was built the name of the village was known as Black River; in 1874, the name was changed to Lorain, the same as that of the county in which it is located. The early village was called Charleston. In its early history, a charcoal furnace was erected about a mile up the river, by S. O. Edison, to this were brought small quantities of ore, sufficient to supply it for smelting purposes.

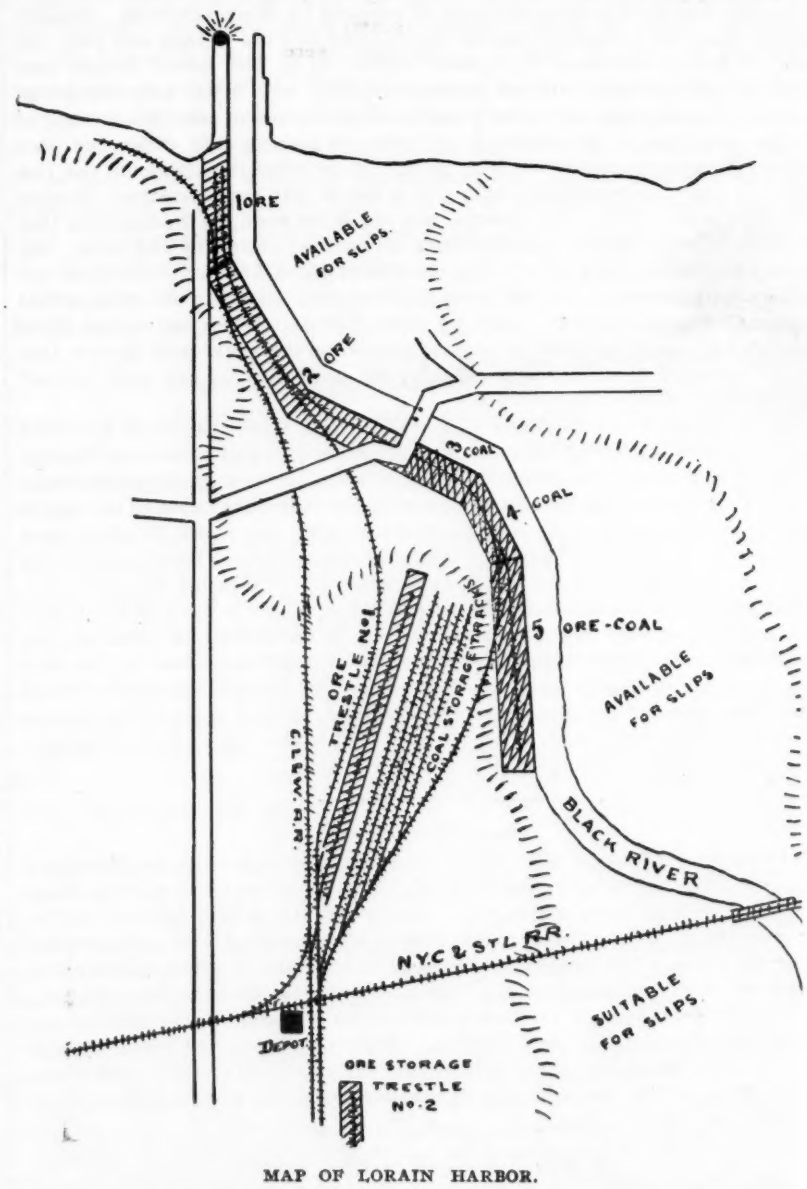
The river maintains a width of some 200 feet for three or four miles, while in depth it certainly evidences the kindly apportioning hand of nature, which has made it twelve feet deep from a half mile beyond the docks to three miles inland, and a depth of nine feet is reached for an additional mile; also on either side the contiguous land is well adapted to the building of large and extensive slips, the acreage suitable for this purpose is distributed as follows, viz.: On the east side of the river and below the high-level roadway bridge, which connects the east and west sides of Lorain, are all of nine acres, of marshy land, which could easily and economically be adapted to an enlargement of the present dockage frontage. While above the bridge, on the same side of the river, fully eighteen acres are available for the same purpose, within one-fourth mile from the lake. One-half mile farther up a like tract is found on the west side of the stream, and one mile back, there are forty acres on each side of the river. These advantages are not confined alone to slips, but they are superior for the location of blast furnaces, being within easy reach of all the materials necessary for their operation, as well as that for kindred iron pursuits. Along the present docks, which have a total frontage of 6,000 feet by an average width of 100 feet, there is a depth of water, at the lowest reaching seventeen feet, and an average of eighteen feet, while at times it reaches twenty feet. This allows of the entrance of the largest lake carriers to transfer their ore cargoes, and receive instead a shipment of coal for the upper lakes, with but a slight shifting of position, thus saving considerable time in getting in and out of port.

Previous to the building of the Lake Shore & Tuscarawas Valley R. R., no vessels drawing over ten feet of water could enter this port; since then a large amount of dredging has been done, only between the piers, to make possible the present entrance of the largest boats. The 10-foot depth existed prior to 1872. In this year the railroad was constructed, thus opening up a means for the shipment of coal in large quantities over the rail-lake route, now opened. The ore receipts did not commence until about 1879, when 12,000 tons were received, while in 1888 there were 195,000 tons, and in 1889, 279,000 tons, nearly doubling in one year. On May 1, 1890, there were 96,000 tons of ore in storage, while on previous years the amount on hand has ranged from 15,000 to 30,000 tons. The shipments for May and June, 1890, have been 112,000 tons, which, if maintained, will, no doubt, make the anticipated handling, for 1890, of 340,000 tons, more than possible.

The ore docks are also used for the coal traffic, interchangably. On docks Nos. 1 and 2 there is a storage capacity of 50,000 tons; the other docks, 3, 4 and 5, are not used for storage, but when utilized for ore handling, they necessitate the unloading into dump cars, for carrying to the large storage trestles Nos. 1 and 2, each one being 1,500 feet long, and having a storage capacity of 100,000 tons each—making a total storage of 250,000 tons. The No. 1, or oldest trestle, is within one-fourth mile of the dock; and the new, or No. 2, trestle is a half-mile distant. No doubt in the near future the storage facilities will be increased, at the least, some 100,000 tons. There is considerable space used for storage adjacent, but forming no part of the trestles, which will amount to fully 100,000 tons, thus bringing the total present facilities for this purpose up to 350,000 tons, and, with the proposed increases, 500,000 tons or more, no doubt, can ere long be credited to the receipts of this port. In handling the ore and coal shipments there are used the following hoists: Dock No. 1, three McMyler rotaries and two rotary boom and mast derricks; dock No. 2, five McMyler rotaries in conjunction with storage bridges and the necessary dump cars. These two docks are principally used in the ore business. Dock No. 3 uses in coal handling two mast and boom hoists, while dock No. 4 uses three McMyler rotaries, and dock No. 5, which is adapted to handling either coal or ore, has provided seven Thornburgh, or Excelsior Iron Co.'s overhead swinging boom hoists. With these facilities twenty-two hatches can be worked at one time. A daily handling capacity of 3,000 tons of ore is had. The recent improvements were—the placing of the seven Excelsior hoists and adding 500 feet to the new No. 2 trestle.

The coal traffic commenced in 1873, over the Lake Shore & Tuscarawas Valley road, then over the Cleveland, Tuscarawas Valley & Wheeling road, under the new management, acquired when the extending of the Lake Shore & Tuscarawas Valley road to Wheeling was projected. Upon this consummation the road came under the present efficient management, and has since that time been known as the Cleveland, Lorain & Wheeling Railroad, with main offices located at Cleveland.

The daily capacity of the coal business has reached 4,500 tons, while the shipments for 1889 were 260,000 tons. To accommodate this traffic there are



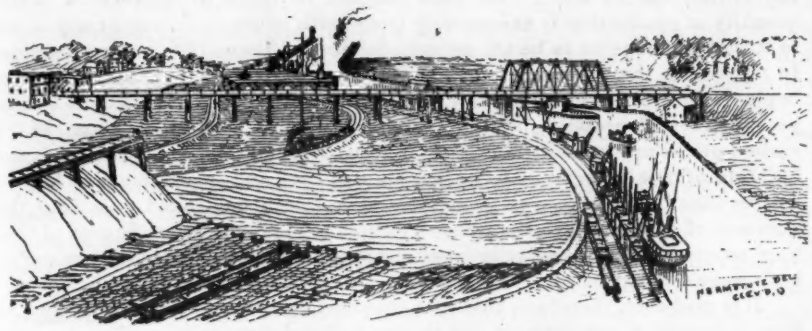
MAP OF LORAIN HARBOR.

provided yard tracks for 1,400 cars, and they use four switching engines, and they propose enlarging the yard to accommodate 150 more cars.

Black River, in its day, was quite active in shipbuilding—from 1852 to about five or six years ago. The early citizens labored under disappointments, but the developments of recent years have amply compensated for these early reverses of anticipations which were the expectancy based upon the probable terminus of the Ohio Canal being located here, but Cleveland gained the prize. There were also two railroad projects, one in 1837, the Ohio Railroad, upon which work was actually commenced, but the entire enterprise never

was carried through. Likewise the Cleveland & Toledo road, which was begun in 1853, was hoped to pass through the lake port of Charleston, but instead Elyria was the successful competitor. The port now has the Cleveland, Lorain & Wheeling and the Nickel Plate roads.

The entrance to the river is protected by two crib piers, upon the western one being placed the light-house. The collector of the port is Mr. Harry



GENERAL VIEW OF LORAIN HARBOR.

Jones. We are much indebted to Mr. Oscar Townsend, general manager, and J. F. Townsend, the traffic agent of the Cleveland, Lorain & Wheeling R. R., for favors extended in the compilation of this article, also to their resident agent, Mr. E. M. Pierce, a most efficient manager of the docks.

MINING IN SOFT ORE BODIES.

We take the liberty of making a few extracts from a private letter received the past week from a friend, a prominent mining man on the Gogebic range. Concerning the mines of the range he says: "There have been some cave-ins, the largest one at the Aurora, closing up No. 3 shaft and wrecking the mine for the greater part of the distance fron No. 2 to No. 4. The greater portion of this was mined out above the fifth level and a cave was expected, although not quite as soon. I think the company are well pleased, now that it is done, and they can work in and remove the pillars that were left. There is no damage of any account as no ore will be lost. The delay and expense of opening new drifts in to the caved portion will constitute about all the 'damage.'

"An anticipated cave occurred at the Norrie a few days ago; three rooms filled up. But this is only within the methods of mining and not to be spoken of as an accident. It is a fact, that, in a majority of the working mines on this range, all concerned would feel much better if this Fall, as soon as the rush of shipping was over, they could feel assured of extensive cavings, provided of course they would occur without loss of life. The biggest problem here is to know what to do with these mines that have heavy caprock. When the caprock is light, or wanting, the ore can be wrought out and the surface material caved in, and all is secure to begin work again. In the other case, there are some mines that have been worked three, four or five levels, then the upper levels robbed, pillars all taken out, timbers taken or fallen out, leaving immense cavities under an unsupported arch of caprock that for the present refuses to come down. This state of things cannot be obviated. You may say leave pillars: That would be a big waste of material even if practicable, but the trouble is the pillars won't be left. At from 75 to 150 feet they will simply settle away from the caprock and crush of their own weight, taking timber and all with them. The big arches overhead will come down some day; to be able to time their coming and to make suitable preparation is the problem of the day."

There have been many methods suggested for the working of the soft ore bodies on the Gogebic, but the plan generally in vogue will probably be followed for at least some time to come, with possibly a few modifications. As workings become deeper it becomes more and more evident that the proper place for shafts is back 50 or 75 feet in the foot-wall, instead of in the ore body or in the hanging. This has of course been recognized as an axiomatic proposition for some time. When the first mines on the range were opened up, there was an inordinate desire to get into the ore and begin shipping as quickly as possible. The sight of the first dyke that was shown up also had a tendency to cause some doubt regarding the permanency of the range, and for these two reasons most of the shafts were sunk in the ore body. Now that the permanency of the mines is assured most of the shafts are being put down in the foot-wall and connected with the ore at proper intervals by cross-cuts, an outlet from the mine being thus assured no matter what may take place in the mine proper.

As suggested in another portion of the letter from which the above extract is made, it is not improbable that the dykes on this range may turn out to be a blessing in disguise, and may prove a valuable aid in the solution of how to remove comparatively all the ore, clean and with safety, at the maximum of expense for timbering. Within the next year or two some developments that will be instructive as well as interesting to mining men may be looked for on the range.—[Lake Superior Mining and Manufacturing Review.

THE editor of the New Castle (Pa.) *News* armed himself with a thermometer, on Thursday of last week, and visited several iron works for the purpose of ascertaining the exact temperature the workers were compelled to work in this hot spell. Around the boilers at the Rosena furnace it registered 131°. In the cinder yard it slid up to 115°. Between the furnace and the rolls at the sheet mill it registered 124°, and in the exact spot where one of the rollers had been at work, it indicated the remarkably scorching heat of 143°, and when they were rolling he said he was satisfied that 190° would more nearly express the condition of the blazing, scorching atmosphere.

IMPORTANT PATENT DECISIONS.

In the *U. S. Official Gazette* of July 29, 1890, are found the following decisions, as having been given by the Commissioner of Patents:

EX PARTE EDDLEBUTE.—Applicant desires that a reference should be withdrawn, since, although applied for before petitioner's application, was not granted until petitioner's application was pending. The decision is this case was that there could not be any interference between the applications, since, although the citation showed and described the same construction as applicant, he did not claim it, the presumption being that the patentee had been familiar with the construction before it was invented by petitioner. An oath under rule 75 being required to prove prior invention and overcome this presumption.

EX PARTE BONNA.—This petition requested that a citation be withdrawn to a reference that was both filed and upon which a patent was granted since Bonna filed his application. The patent shows and describes, but does not claim the invention claimed by applicant. In this case, the examiner erroneously called for an oath under rule 75, the presumption being that the applicant was the earlier inventor. The petition was granted.

EX PARTE FAURE.—Appeal from Examiner in Chief—This case illustrates the general fallacy that anything can be patented, the applicant applying for a patent on an improvement in the application of secondary batteries as a motive power. Where the priorant discloses that it is old and well known to apply electrical energy to the propulsion of a boat, locomotive or vehicle by means of a primary battery mounted thereon. Held that there is no invention in applying the Faure secondary battery to the propulsion of vehicles, no adaptation being required to make it available for the specified purpose. To the Faure battery must be ascribed all the success which attends upon all the uses to which skilled mechanics have the capacity to apply it. A "newly discovered benefit," if it result from the ordinary use of the contrivance (whether patented or not) which produces it, is not patentable. This case was appealed to the Supreme Court of the District of Columbia (Justice Hayner) and Commissioner's decision confirmed.

The *Gazette*, of August 5, contains the following decision of State courts:

Supreme Judicial Court, State of Massachusetts, Wilson vs. Martin-Wilson Automatic Fire Alarm Co. Transfer of title to letters-patent, by order of court. Assignment by master. Creditor's bill. Under Public Statutes of Massachusetts, chapter 151, section 2, clause 11, authorizing "bills by creditors to reach and apply * * * any property, right, title, or interest, legal or equitable, of a debtor within this State, which cannot be come at, to be attached or taken on execution in a suit at law," and act of 1884, chapter 285, authorizing a bill to reach and apply in payment of a debt any property of debtor, as provided by the above act, "notwithstanding certain facts specified," "or that it is of uncertain value, provided the value can be ascertained by a sale, or appraised, or by any means within the ordinary procedure of the court," the court may decree that the master make and deliver an assignment of letters patent if the defendant refuse to assign them. The *situs* of a patent right is not such that it cannot be sold under a decree of a State court having jurisdiction over its owner.

A New Siemens Furnace.

A new Siemens furnace is thus described by Messrs. Head and Pouff: In an ordinary gas producer carbonic acid is formed on the grate, and this is converted into carbonic oxide by being passed through incandescent fuel in the upper portion of the producer. This carbonic oxide mixed with other gases distilled from the coal supplies the source of heat for the furnace. The production of the carbonic acid is attended with the development of heat, but its conversion into carbonic oxide absorbs heat. These facts are, of course, well known, but it is well to repeat them here as they bear on the process about to be described. When the gases have been burnt in the heating chamber of the new Siemens furnace, a portion of the products of combustion is taken to below the grate of the gas producer, and a large part consists of intensely-heated carbonic acid, which is converted into carbonic oxide in the converter by taking up another atom of carbon. The idea is ingenious, although at first sight it would seem as if an effort was being made to create heat. No such impossible task, however, is being attempted. All that is done is to catch the waste heat of the furnace gases and utilize it for gasifying the fuel in the upper zone of the producer. In the ordinary Siemens furnace, of course, the heat of the products of combustion is not wasted, but is arrested by the checquer work of the regenerators, and in the new furnace there are air generators, too. It became a question, therefore, whether there would be sufficient heat in the products of combustion from the furnace to convert the fuel into carbonic oxide and to heat the regenerator. This question has been answered in the affirmative in the course of a year's regular working. The new furnace has been applied for heating and welding iron, for copper and steel melting, and for puddling, with success. It is said by the authors to effect a saving in fuel of two-thirds in weight, as compared with ordinary solid fuel furnaces; or, if allowance be made for using the waste gases for raising steam, 560 lbs. of coal per ton of iron heated; and there is a reduction in the waste of iron equal to 5 per cent. There is also said to be a saving in labor and repairs.—[Glasgow Engineer.

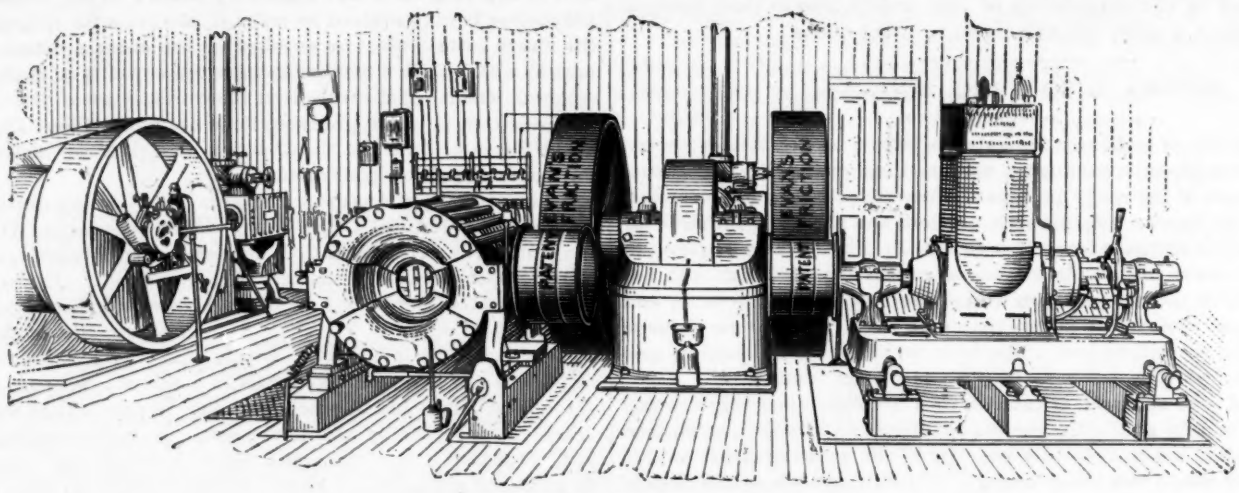
Steel Rails.

We note sales by Eastern mills aggregating about 20,000 tons, these being included in that total of the block of 8,000 tons for Savannah delivery referred to in former reports. The bulk of the other sales were also for Southern roads. The rumors of low prices made on this business are authoritatively denied by both buyer and seller. Eastern mills are in receipt of large inquiries from Western roads, which, of course, they cannot bid on as the markets East and West now stand. Among the inquiries is one for about 25,000 from a Pacific road, for delivery during the first half of 1891. We continue to quote $31@$31.50, at Eastern mill.—[Iron Age.

THE EVANS FRICTION CONE.

The accompanying cut of a portion of the Hutchinson (Kan.) Water Light & Power Co.'s station is introduced to illustrate the manner in which two dynamos may be driven directly from an engine, by the use of the Evans Friction Cone. The dynamo at the left is a Thomson-Houston "M D" dynamo with a capacity of 50 full arc lamps, and the machine is fully loaded. The Edison machine is a number 16, 720 incandescent lamps. They are both driven from the fly-wheel of an Armington & Sims engine. This plant has been running constantly since January, 1890, and is giving entire satisfaction in every respect.

There are many places where, owing to the shape of the space alloted to the engines and dynamos, this arrangement is most desirable. The plant in the new Shoe and Leather Exchange Building, in Boston, is of the same type as that shown in cut. Two 650-light Mather dynamos are driven, one from the fly-wheel, and the other from the governor-wheel of a McIntosh & Seymour engine. These two plants are instances where the advantages of our system are unusually apparent. In the case of the station at Hutchinson, where the arc machine furnishes the current for street lamps, and the incandescent machine for commercial lights, it is a great advantage to stop and start either machine as the requirements of the service may require. This is equally true of the plant in the Shoe and Leather Exchange Building. For a portion of the day one machine will furnish all the current necessary to supply what few lamps may be in use; but later in the day, or in cloudy weather, the demand may be in excess of the capacity of one dynamo, and it will then become necessary to throw in the reserve machine. This can be done without even slowing the speed of the engine. For further particulars, address the Evans Friction Cone Co., 85 Water street, Boston, Mass.



THE EVANS FRICTION CONE.

STATISTICS OF MANUFACTURING INDUSTRIES.

The trade statistics of the eleven leading manufacturing industries, cotton, woolens, chemicals, paper, agricultural implements, lumber, flour, glass, iron and steel and shipbuilding, are so complete and accurate that they anticipate the census reports, and show the growth of manufactures during the last decade. The following is a summary of 1889, compared with 1879:

	1879.	1889.	Increase.	Increase per cent.
Capital invested	$1,165,000,000	$1,784,740,000	$519,740,000	53.2
Hands employed	844,776	1,274,000	429,224	50.1
Paid for wages	$ 256,795,000	$ 350,689,000	$ 93,894,000	36 6
Raw material consumed	1,197 000,000	1,576,c00.000	379,000,000	33.2
Manufactured product	1,774,000,000	2,293,779,000	519,779,000	29.3
Value of product above value of raw material	577,000 000	717,779,000	140,779,000	24.4
Percentage of increased value	48.2	45.5	dec. 2.7	dec. 5.6
Difference between such increased value and the wages paid	$ 320,205,000	$ 367,090,000	$ 46,885,000	14.6
Percentage of such increased value paid as wages	44.5	48.85	4.35	9.8
Percentage of the difference, including expenses other than wages, profits, etc.	55.5	51.15	dec. 4.35	dec. 7.8
Average wages per year	$304	$275	dec. $29	dec. 9.5

The above table will furnish food for thought for every student of statistics. Statesmen, politicians, protectionists, free-traders, labor agitators and socialists will all find in it something to support their pet theory of political economy. In our opinion the table is chiefly instructive in showing how figures will lie, and how incorrect conclusions may be drawn from even a correct table of figures. Assuming that the above figures were correctly compiled from actual statistics reported with accuracy, and we have no reason to doubt that they were, the immediate conclusions which may be drawn from a hasty inspection are:

1st. While capital invested has increased 53 per cent., and the number of hands employed increased 50 per cent., the total wages increased only 36.6 per cent., while the average wages decreased 9.5 per cent.; the raw material used increased only 33.2 per cent., the manufactured product only 29.3 per cent., and the increased value given to the raw material by manufacturing it increased only 24 4 per cent.; therefore, both capital and labor are becoming less productive than heretofore.

2d. The number of people engaged in these manufacturing industries has increased faster than the population, and their average wages have decreased 9.5 per cent.; therefore, the poor man is becoming poorer, etc.

3d. That, although wages have decreased, the returns to capital have decreased still more; because of the total increase of value of the manufactured product above the value of the raw material, labor now receives 48.85 per cent. of it, while in 1879 it received only 44 5 per cent. of it, therefore while capital still gets the lion's share of the returns, 51.15 per cent., as compared to labor's 48.85 per cent., it is not robbing labor quite as much as it did ten years ago. A more careful study of the figures, however, would throw doubt upon all these conclusions, and if the industrial conditions existing in 1879 and in 1889 are compared, entirely different conclusions may be arrived at.

In the first place, the years 1889-90 are exceptionally good years for census and other statistical work, since they are noted for a remarkably steady condition of business, neither inflation nor depression, boom nor panic characterizing it. Prices of all commodities average rather low, but considerably above the bottom figures which have been reached in times of depression, while quantity of production is enormously large, with consumption so nearly equal to it that there seems to be no serious danger of immediate overproduction. In 1879-80, on the contrary, business was in a most excited condition. The beginning of 1879 saw the country, apparently slowly recovering from a seven-year period of depression, but that Summer brought a stupendous boom, which rushed prices up to absurdly high figures, stimulated production and the building of new factories at an unprecedented rate, and raised wages to higher figures than had been known since 1872. The boom continued well into the Summer of 1880, so that the census figures and all statistical figures of that time represent a temporarily inflated condition of business, and temporarily high wages and prices.

It is probable, therefore, that the apparent decrease of wages from $304 to $275 is largely, if not entirely, due to the inflated figures, prevailing in 1879; and that if the census had been taken in 1878 instead, the average wages would appear as much less than $304.

During the last ten years two prominent facts characterize our manufacturing industries: 1st. An immense investment of capital in them which appears, not in the multiplication of the number of establishments, but in more expensive buildings, machinery and special tools. This accounts for the increase of invested capital of 53.2 per cent. in ten years. 2d. The consolidation of several industries into one establishment, not so much in the direction of consolidation of competing concerns under one management, in the case of trusts, as in the diversifying of the character of the operations carried on by one concern. This has been especially noticeable in the iron and steel business. A works which ten years ago started to make nothing else than steel rails, buying all its pig iron, now makes more pig iron than it can use, owns its own coal and ore mines, turns steel into various other shapes than rails, makes castings of its surplus pig iron, and finishes them in its own machine shop. This sort of consolidation upsets completely any proper comparison of statistical figures obtained before and after the consolidation.

I suppose in 1879 there were three concerns, a blast furnace, a steel works producing steel ingots and blooms, and a steel finishing works, the second using the product of the first as its raw material, and the third using the product of the second. The statistics of these three works might appear as follows:

BLAST FURNACE.

Raw material, ore, coke, limestone and supplies	$500,000	
Labor	250,000	
Other expenses and profits	250,000	
		$1,000,000

STEEL WORKS.

Raw material, pig iron	$1,000,000	
Fuel and other supplies	100,000	
Labor	250,000	
Other expenses and profits	250,000	
		$1,600,000

STEEL FINISHING WORKS.

Raw material—steel blooms	$1,600,000	
Raw material—fuel and other supplies	200,000	
Labor	250,000	
Other expenses and profits	250,000	
		$2,300,000
Total		$4,900,000

A census of the above manufacturing concerns would show:

Raw material	$3,400,000	
Labor	750,000	
Other expenses and profits	750,000	
		$4,900,000

Suppose now that the three concerns consolidated into one, used the same raw material as before, the same labor, and paid the same for other expenses and profits, the census then would show:

Raw material for blast furnace	$500,000	
Other raw material for steel works	100,000	
Other raw material for finishing works	200,000	
		$800,000
Labor		750,000
Other expenses and profits		750,000
		$2,300,000

A comparison of the two censuses, without going "behind the returns," would lead to the false conclusion that the manufactured product had de-

creased from $4,900,000 to $2,300,000, and that the raw material used had decreased from $3,400,000 to only $800,000.

Erroneous conclusions of this kind will necessarily be drawn from comparisons of the statistics of 1879 and 1889, uless it is borne in mind that in all the census the "manufactured product" of one concern is the raw material of another, that the ton of iron in an iron ore will appear in the returns of the mine, of the blast furnace, of the steel converting works, of the steel bar mill, and of the hardware manufacturer, and be added up in the industrial statistics as five tons instead of one, and that a pound of cotton may appear in the returns of the plantation, the yarn mill, the weaving mill, the print works, and the clothing manufacturer as five pounds instead of one. The consolidation that has taken place during the last ten years will make the duplication of figures much less in the census of 1890 than it was in the census of 1880, so the increase in the total value of manufactured products may appear in the returns as much less than the actual increase.

On the other hand, the figures of the eleven industries above given show that while in 1879 the increased valve given to the raw material by manufacturing it was 48.2 per cent., the increase in 1889 was only 45.5 per cent. This is exactly opposite to what could be expected from the consolidation of several industries into one, preventing thereby the duplication of the returns, and some other cause must be looked for to explain this decrease. It is, no doubt, due to the greater efficiency of machinery, which has greatly decreased the cost of manufacturing, and therefore the difference between the cost of the raw material and that of the finished product. If wages were precisely the same, it would cost much less to turn a ton of iron ore into steel, or a pound of cotton into calico, than it did ten years ago, on account of the greater perfection of machinery, by which wastes and repairs are saved, and production hastened, reducing the percentage of running expenses.

The decrease of the cost of manufacture, other than wages, including general expenses of every kind and profits, from 55.5 to 51.15 per cent., and the corresponding increase of wages from 44 5 to 48.85 per cent. of the increased value of product due to manufacturing it, is most notable, and it can scarcely be interpreted otherwise than that labor is getting a larger share of the product of manufacturing than before. It does not necessarily follow that the capital invested in manufactures is getting a smaller return, for the decrease from 55.5 to 51.15 per cent. may largely consist of a decrease in repairs, taxes, insurance, rent, transportation charges, and wastes of various kinds, which are decreasing in relation to volume of production, as methods of manufacturing are perfected.

That the increase of value of manufactured product over the value of the raw material is only 24.4 per cent., while the capital invested increased 53 per cent., and the number of hands employed increased 50 per cent., is largely due, no doubt, to the low prices of manufactured products in 1889, as compared with the inflated values in 1879, and is not at all due to decreased efficiency of labor. If statistics of the quality of product were at hand, they would probably show a steady increase in the efficiency of labor, due to the introduction of improved machinery, as well as to increased intelligence of the labor itself.

The apparent decrease in wages from $304 to $275 is more than offset by the increased purchasing power of these wages, due to low prices of the manufacured products, and the fact that labor appears to be getting an increasing share of the total product is a most satisfactory indication of an important advance in our civilization.—[Engineering and Mining Journal.

Hydraulic Manufacture of War Material.

A powerful hydraulic tube-press for forming metal and steel tubes from circular plates by pressing or forcing them by the aid of mandrels through dies or angular rings has been designed and built by Henry Bessemer & Co., of Sheffield, says the *Popular Science News*. The press will be used for the manufacture of tubes of large size, and more particularly for making sharpnel, segment and other hollow steel projectiles, which the government is now anxious to obtain. Hitherto these projectiles used by the English artillery have been made either of cast iron or steel, but the wrought material has proved so much superior that forged hollow projectiles are bound to supercede the present cast materials. The press is built entirely of Bessemer steel of sufficient strength to impart a downward pressure of about 1,500 tons, with a stroke of 12 feet. It is also furnished with two cylinders with an upward pressure of 500 tons, for the purpose of stripping tubes from mandrels. This process of producing hollow tubes and projectiles will, it is said, dispense with the old method of boring them from the solid bar, which was not only very expensive, but prevented rapidity and extent of output.

The Pennsylvania Tube Co. to Abandon Natural Gas.

The Pennsylvania Tube Co., of Pittsburgh, is preparing to abandon the use of natural gas in its works and return to the use of coal for fuel purposes. At the present time thirteen regenerator gas producer furnaces are being put in the works by the Smythe & Laughlin Co., some of which will be ready to use in about thirty days. Slack coal will be used for making the gas in the regenerators. This is the first industrial institution in Pittsburgh to abandon natural gas entirely and to start to use manufactured gas for fuel purposes. Several other firms have the question under consideration.—[Bulletin.

The Uniontown Iron Works Sold.

The plants of the Columbia Iron & Steel Co. and the Pennsylvania Construction Co. are reported sold to an English syndicate. E. M. Butz, General Manager of the two concerns, left for London two weeks ago to consummate the deal. The consideration is thought to be about $1,000,000, as the value of the plants is estimated at that figure. The concern will continue to run under the present management, provision having been made for this in connection with the sale.

BLAST FURNACE WORK.

Our highest living authority on blast furnace work is Sir I. Lowthian Bell. Consequently, any contribution he may make to the literature of the subject is of much interest to furnace owners and to the iron trade in general. At the annual meeting of the Society of Chemical Industry, of which he is the retiring President, Sir Lowthian devoted his address entirely to the chemistry of blast furnace work, which he dealt with in a very interesting manner. To metallurgical chemists the address was of special importance, but it was of moment also for iron-masters. Having dealt with the saving of fuel obtained by the adoption of the hot blast, as well as the greatly increased output of pig iron obtained by that method of working, Sir Lowthian discussed in detail the subject of the advantages derived from increasing the height of the blast furnace.

Mr. John Vaughan built a furnace 71 feet in height, because he expected to increase the make, and in that he was not disappointed. The loftier stack did greatly augment the output, but it also saved a notable quantity of coke—something like 4 cwt. per ton of iron. Later on, at the Clarence Works, the height was increased to 80 feet, with the net result that the coke used per ton of iron made fell to 22.5 cwt. as compared with 28.5 cwt. in the old 48-foot furnace. This economy being established, an iron-master thought he could get still better results by building furnaces 100 feet in height. He built his two 103½ feet high, and when they were at work reported that he was making a ton of iron with 18 cwt. of coke. Sir Lowthian thought this was impossible, because it was a saving of 4 cwt., which was 30 per cent. more than the entire loss of heat in the waste gases of an 80-foot furnace, and upon careful investigation found it was a mistake to imagine that there was any such difference in the consumption of coke as had been supposed. He thought, therefore, that a height of 80 feet and a capacity of 16,000 cubic feet would suffice to ensure all the efficiency we could expect in this direction.

As to the use of limestone or lime, Sir Lowthian gave particulars of sundry experiments which had been made with calcined limestone. Caustic lime had been tried at various times and by different iron-masters, but not with success. So far back as 1875, indeed, he had shown that in 80-foot furnaces there was no economy in using caustic lime, and had described the reasons why that should be the case. With regard to the chemistry of the reduction of oxide of iron in the blast furnace, Sir Lowthian's facts and figures are too involved to be reproduced here, but we may note that he differs from Deville and Cailletete, and adds that he regards it to be practically impossible in a blast furnace to completely convert CO into Co_2 in reducing iron oxide.

At the conclusion of the address Sir Lowthian referred to the fact that the duty performed by the blast furnace is by no means equivalent to the whole of the useful effect which coke is capable of affording. Taking a ton of coke as being able to produce 20 cwt. of pig iron from Cleveland ironstone, that represents 147,200 calories, whereas about 90,000 calories has been the limit of the power actually obtained "This apparent sacrifice of nearly 40 per cent. is incurred by what is considered the physical impossibility of bringing, in this particular process, the whole of the carbon burnt to its highest point of saturation with oxygen." But the unexpended energy of the fuel is not wasted, as was formerly the case. It is caught and burned under the boilers, in the hot-air stoves, and at the Clarence Works, for the evaporation of brine. Thus, although there is a considerable apparent loss of heat, it is not wasted by any means, but is made to subserve many very useful functions in connection with the operations of the furnaces. Much may yet be done in the way of fuel economies, but Sir Lowthian is justified, as matters stand now, in "attempting" as he says, "to establish for the blast furnace a character for an economical use of fuel."—[London Ironmonger.

A Big Chicago Plant.

South Chicago is to have another industry added to the long list of enterprises located at that point during the last eight months. A system of blast furnaces which will rival that of the Illinois Steel Co. will soon be in active operation on the opposite bank of the river. The Iroquois Furnace Co., consisting of Youngstown, O., and Pittsburgh capitalists, has quietly purchased a $100,000 site, drawn up the plans and secured permits for a building of equal value, and in a few days the contractors will have from 100 to 200 men at work on the buildings.

The Chicago & Calumet Dock Co. has sold Block No. 109, lying between Ninety-fifth street and the Baltimore & Ohio Railroad, with a west frontage on the Calumet river, to S. Frank Eagle, of Youngstown, O. Mr. Eagle will represent Eastern capitalists, with whom a number of Chicago men are expected to co-operate. As yet no definite clew can be found to the identity of these Chicago investors, but the name of E. C. Potter is freely connected with the enterprise. E. C. Potter was the Vice-President of the Illinois Steel Co. until the disagreement in the management, and the consequent reorganization of the company, last Spring, The fact that he scarcely takes kindly to the new order of affairs, and that his old interests were identified with the Calumet region, gives color to the report. At his office recently a representative of Mr. Potter denied his reported connection with the new enterprise, and volunteered the information that Mr. Potter was entirely ignorant of the existence of any such corporation.

The plans of the part of the plant to be completed this Summer have been drawn. They provide for one furnace and four stoves, with the necessary buildings. A stock house is to be built along the river front, extending north and south; a casting house, 165x64 feet will extend east from this, and the necessary boiler and engine houses will be built on the north. The site is a desirable one, as it lies within half a mile of the Calumet harbor, and will have dock privileges of such a nature that ore from the Lake Superior region can be transported directly from Escanaba and lake points to the furnaces.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

The Norrie, at Ironwood, broke all previous records for a single day's shipment, August 6th, by shipping 8,440 tons of iron ore. The Norrie has gradually increased her lead over the Chapin, until she is now nearly 60,000 tons ahead of the giant of the Menominee. The Norrie's output for this season will exceed 900,000 tons and crowd 1,000,000 tons very closely.—[Iron Spirit, Bessemer.

The Metropolitan people are rushing their work on the property west of the Sunday Lake, and adjoining the Federal. A working shaft, 8x12 has been put down 100 feet, and considerable drifting and cross-cutting is being done to learn the natural drift of the rock rather than with the expectation of finding ore, for they expect to be compelled to sink to a depth of 200 or 300 feet, to a level with the Federal deposit, before encountering the vein, which every indication leads them to believe is there.—[Mining News.

MARQUETTE RANGE.

The Lake shaft of the Lake Superior Iron Co. has reached a depth of about 240 feet, and is in hematite formation.—[Iron Ore.

Diamond drill work at section 18, near the old Saginaw mine, which has been conducted for some months by Ishpeming parties, has been discontinued. Just what has been revealed by the drill at this point is not stated by those who had the work in charge.—[Iron Ore.

At the Crown exploration to the east of the Negaunee mine, Negaunee, the diamond drill is showing the right kind of formation, but a sufficient depth has not yet been reached to find the ore. It is thought that the latter will be encountered at about 300 feet from the surface.—[Iron Ore.

A deposit of strictly pure hematite ore, high in manganese, has been uncovered in the shaft at the East Jackson, and something of its extent will be known during the next ten days. It is a beautiful ore, and the hope that it may hold to profitable proportions, as seems probable, is common.—[Iron Herald, Negaunee.

The work of reopening the No. 7 shaft at the Jackson, which was closed by a cave-in some weeks ago, is being pushed. The process of sinking through the jumble is necessarily slow, as but two or three men can work at a time, and as the old timbers are taken out dirt rolls in. It is predicted that snow will fly before this portion of the mine is reached by the No. 7 shaft.—[Iron Herald, Negaunee.

MENOMINEE RANGE.

Reports from the explorations west of the Ludington are still of the most encouraging character, and the prospect of several good mines between the Ludington mine and the Menominee river are daily approaching nearer to a certainty. Another exploring camp is to be established at once on H. S. Benjamin's option west of the Menominee river.—[Menominee Range.

On the 20th of June, 1889, No. 2 shaft at the Hamilton mine reached the ledge. To-day it is 570 feet deep, having been sunk all the way through the hardest kind of lime rock—not a bad record for fourteen months. It is said that the largest hoisting plant in the world will be set up at this shaft.—[Menominee Range, Iron Mountain.

The Lustfield Exploring Co., being A. Lustfield, of this city, and several Cleveland, O., gentlemen of means, has been organized, and commenced exploratory operations on lot No. 2, section 20, 43-32. The land lies between the Youngstown and Monitor mines, which makes it a desirable property to operate.—[Diamond Drill, Crystal Falls.

The Mansfield mine began shipping July 14th, and to-night will have a shipment of 5,000 tons to its credit. The output for the season is placed between 30,000 and 40,000 tons. On the first level (the only one at present) two stopes are being worked. The output is now 200 tons per day.—[Diamond Drill.

Work on the old shaft at the Nanaimo mine has been discontinued and a new one is being sunk at the south end of the open pit. It will be 7x14 feet inside of timbers, capable of accommodating two skip tracks and a ladder-way, and will be sunk 175 feet before any drifting is done. The first of the week a steam drill will be put to work, and sinking will be rushed forward as speedily as possible. The first 100 feet the shaft will be entirely free from water, owing to the pumps in the old workings being placed below that depth and the water being continually drained off. It will take about two months to sink the shaft to the required depth.—[Reporter.

The Atlas, Capt. C. T. Robert's promising exploration on the southwest quarter of the southeast quarter of section 12, 42-33, has a depth of main shaft of 100 feet, and has turned out some very promising indications. The shaft will be continued to 150 feet, but it is expected that the ore will be cut in place before that depth is reached, the indications for such are the best.—[Diamond Drill.

A force of eighty men is employed at the Armenia mine. The shipment is about 16,000 tons, which is a fair showing, considering the many inconveniences the property has been subjected to since the first of the year.—[Diamond Drill.

Iron Land Contest:—

Papers in a very important land contest, involving the title to iron lands on the Vermilion range near Ely, which are estimated to be worth about $500,000, have been forwarded to the general land office at Washington. The land in question is the northeast quarter of the southwest quarter of section 30, township 63 north, range 11 west, including forty acres.

It is a somewhat complicated case. The land is now covered by the Chippewa half-breed scrip location of James H. Warren, made on October 15, 1885. Subsequently, Emil Hartman offered to locate the land with revolutionary bounty land warrant No. 46, issued to the executors of the estate of Robert A. Porterfield, deceased, under act of April 11, 1860. Hartman's offer was rejected by the register of the land office here, and he appealed to the general land office. Then Thomas W. Hyde offered to file a pre-emption claim on this land, claiming prior settlement. His offer was rejected, and he at once filed a contest against the land, claiming it by virtue of pre-emption settlement. Next came Noel Touchette, of Ely, who offered to make pre-emption filings, claiming settlement on the land. Touchette's offer was rejected by the register, on the same ground as were those of Hartman and Hyde, because it conflicted with the Chippewa half-breed scrip location of Warren.

Touchette has now, through his attorney, Capt. W. H. Smallwood, moved the commissioner of the general land office for permission to come in and be heard as an intervenor in the proceedings at present pending on the part of Hartman and Hyde against the Warren location. Touchette declares that on November 20, 1889, he made actual settlement and established a residence on the land in question and has since resided on it. He bases his claim to make pre-emption filings on this land on the ground that Hartman's application to file the Porterfield scrip was properly rejected by the register and receiver, inasmuch as the Warren location was already a final entry of record in the land office, and that Hartman should have first cleared the record by a contest, instead of appealing from the register's decision. He thinks his claim is superior to Hyde's because Hyde has already contested another portion of the same quarter-section on the ground of settlement and the case was decided against him. Touchette claims as an actual settler, and holds that, if Hyde ever had any rights as an actual settler, he has waived them by claiming other land and has forfeited them by assiging his interest. Hartman's offer to file the Porterfield scrip was, Touchette contends, in the nature of an attempt to make final entry right on a final entry.—[Duluth News.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, August 6th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	Pitts. & L. Angeline	144,359
Barnum	6,698	Humboldt	9,903	Prince of Wales	14,813
Buffalo	47,995	Imperial	11,659	Prout	7,445
Cambria	41,396	Jackson	64,831	Queen	61,723
Champion	123,708	Lake Superior	167,557	Republic	106,056
Cleveland	134,599	Lillie	19,161	Republic Reduction Co.	1,115
Cliffs Shaft	90,316	Lucy	26,331	Salisbury	48,493
Detroit	1,230	Marquette Ore Co	1 057	South Buffalo	59,315
Dexter	630	Michigamme	32,434	Volunteer	63,550
East New York	18,603	Milwaukee	19,837	Winthrop	53,379
Fitch	2,744	Negaunee	37,693		
Total, Marquette Range					1,419,171

MENOMINEE RANGE.

Aragon	11,109	Half and Half	383	Norway	35,388
Armenia	16,555	Hamilton	11,437	Paint River	28,911
Chapin	370,441	Iron River	77,716	Perkins	5,165
Commonwealth	59,304	Ludington	42,218	Pewabic	9,036
Cyclops	34,192	Mansfield	2,381	Shafer	28,615
Dunn	73,977	Mastodon	38,856	Sheridan	595
Florence	90,748	Millie	17,224	Vulcan	69,362
Great Western	44,494	Monitor	8,103	Youngstown	19,946
Total, Menominee Range					1,102,669

GOGEBIC RANGE.

Albany	14,740	Eureka	10,125	Pabst	47,651
Anvil	20,721	Father Hennepin	6,853	Palms	14,386
Ashland	29,875	Federal	4,308	Ruby	4,507
Aurora	121,607	First National	105	Section 33	47,975
Beaver	1,672	Germania	23,708	Superior	12,002
Brotherton	24,408	Iron Belt	56,859	Trezona	28,296
Cary	33,549	Montreal	6,630	Windsor	16,665
Colby	115,975	Mt. Hope	24,688		
Davis	270	Norrie	400,729		
Total, Gogebic Range					1,258,196

VERMILION RANGE.

Chandler	159,828	Minnesota Iron Co	259,225	Pioneer	1,795
Total, Vermilion Range					420,878
Grand Totals					4,200,914
To corresponding date of 1889					3,732,572

The *Mining Journal* of the current issue says: The record of ore shipments is not of that ample nature which those readers have a right, from immemorial precedent, to expect. Our correspondent, at Ashland, may have done his full duty, and sent us his report of shipments from the port which sends out most of the ore which the great Gogebic range produces from week to week, but accident, carelessness or the failure of postal facilities has prevented that report from reaching this office. Similar misfortunes, or the overwhelming rush of iron ore at Two Harbors, has prevented us from receiving a report from that point.

Corrosion of Steel.

The corrosion of steel by salt water is said to be much greater than that of iron. Mr. David Phillips stated in a recent address before the British Institute of Marine Engineers that he had experimented from 1881 to 1888 with two plates of Bessemer boiler steel, two of Yorkshire, and two of B. B. Staffordshire boiler iron. The plates were, as nearly as possible, 6x6x⅜″, and were kept immersed in salt water. The results show a great difference between the behavior of steel and iron; the steels lost 120 per cent. more than the irons the first three years, when the plates were in contact; 124 per cent. more the second three years, when they were insulated; and 126 per cent. more for the whole period of seven years.

Increase of Wealth in the United States.

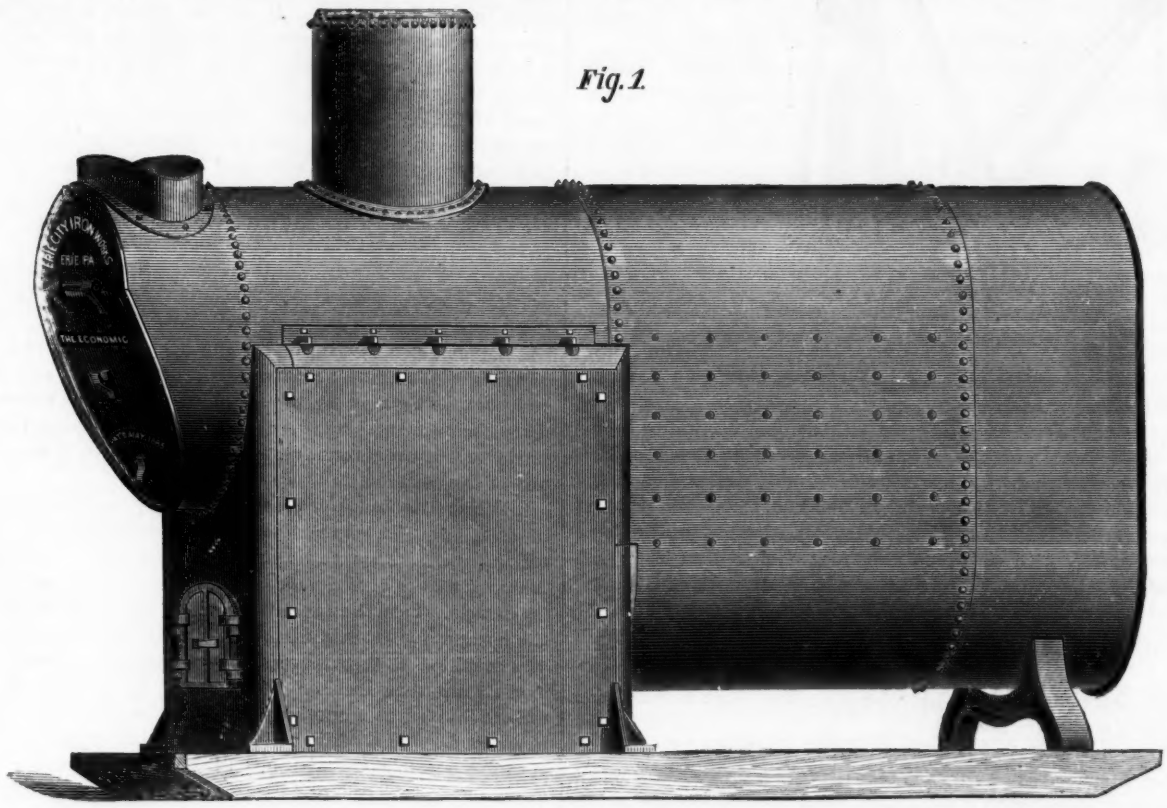
The rapid increase of the wealth, business and prosperity of the United States, during the past ten years, is simply marvelous. According to the published figures the total wealth of the country is now $71,459,000,000, equal to nearly $1,000 per capita. This is an increase in ten years of $18,000,000,000, or 42 per cent. England's wealth in 1885 is given at $50,000,000,000. The average of wealth per head in England is $1,545, in Scotland $1,215, in Ireland but $565. The total wealth of France is estimated at $36,000,000,000. England exacts in taxes $20 per head of population, while each individual in the United States pays $12 50. America will produce 7,000,000 tons of iron this year, while England's greatest production is 8,600,000 tons.—[Engineer.

THE "ECONOMIC" BOILER.

The "Economic" boiler herewith shown occupies but little space, is a rapid steamer, and combines with safety of the stationary return tubular, the convenience and portability of a portable boiler. The front end of the boiler is cylindrical in form and extends over the furnace, forming the crown sheet. The rear end is oval, the lower portion extending below far enough to hold the short tubes leading from the furnace to the back connection. The boiler is thoroughly braced, and made of steel plate and in the best manner throughout. The furnace is brick lined, and can be detached when desired. The fire-brick are held in place by iron rods which are protected from the fire, and can be removed and replaced when necessary. The furnace is large with ample grate surface. In the ordinary portable boiler the crown sheet is flat, and, although subjected to the greatest heat, is the first part exposed by low water. The sides of the furnace are difficult to keep clean and liable to burn out. In the "Economic" the cylindrical crown sheet gives a large effective heating surface, fully protected by water. There are no water sides to fill with sediment, and the fire-brick lining of the furnace insures a very high degree of temperature and combustion of the gases, and consequent economy in fuel. These boilers are tested and inspected before shipment, and the purchaser can have a certificate of inspection from the inspector of the company, and a policy of insurance for one year issued by the company. This policy is made payable to the purchaser, and will be in force and valid wherever the boiler is located. The insurance in all cases will equal the list price of the boiler up to $400. Additional insurance, when wanted, over that amount will be charged at the rate of one and one-quarter per cent. These boilers are manufactured by the Erie City Iron Works, Erie, Pa.; branch office, 15 Sonth Water St., Cleveland, H. L. Hebebrand, manager.

Among the Cleveland users of the "Economic" boiler are: M. M. Spangler, malster; Theo Kundtz, sewing machine factory; John S. Oram, machine works; Ohio Baking Co., bakers; Wm. Kenney, box factory; Thomas Quayles' shipyard, Cleveland Stone Co., Malone Stone Co., and many others.

Fig. 1.



THE "ECONOMIC" BOILER.

Shipbuilding on the Lakes.

Ship-yards on the lakes are to turn out vessels of 124,750 tonnage in the aggregate for 1890. At Bay City, the yards of F. W. Wheeler employ 1,300 men, and there are now under construction fourteen vessels of an aggregate value of $1,720,000. Further up on the Saginaw river, James Davidson has 600 men to work on nine boats, two of which are 3,000 ton wooden steamers with a contract speed of thirteen miles per hour. Mr. Wheeler is now building two new steel ships for the Atlantic; they will be 275 feet long, 41 feet beam, and 26½ feet molded depth; they will each carry 3 500 tons with 20 feet draught; and cost $225 000 each.

As Canadian canal locks are too small to take vessels of this size, they will be towed to Buffalo, there cut in two by removing the rivets at a certain point where there is a permanent bulkhead across the ship. A temporary bulkhead in the other half, put in at the yard, will provide two distinct boats for navigation through the Welland and St. Lawrence canals, the lake and river to Montreal. At the latter place the two halves will again be joined on dry dock; the ship will then steam to Newport News to carry coal to New York or Boston.

At Detroit, the Detroit Dry Dock Dock Co. is finishing the last of six steamers for the Vermont Central line, between Chicago and Ogdensburgh. The Maryland, now being built for the Inter Ocean Transportation Co., will be the largest carrier on the lakes, having a capacity of 3.500 tons. She was finished in June, and is to be used in carrying ore from Escanaba to the rolling mills of South Chicago. Detroit has also two smaller yards.

At Toledo, O., the Craig Shipbuilding Co. has completed the erection of a plant, and turned out its first steel ship in June, sold for $155,000. The yards in Cleveland, O., are busy, and five steamships for the Lehigh Valley R. R. are afloat. Three other steamers are being built for the Minnesota Steamship Co. for ore-carrying purposes. Mr. H. H. Brown, of Cleveland, has just had built for him the Castalia, an ore-carrier and a yacht combined. The Cleveland Shipbuilding Co. is constructing two large steel steamers for the Lake Superior Iron Co.

The Union Dry Dock Co., of Buffalo, N. Y., is building a steel steamer for a Buffalo syndicate, and another for the Wabash R. R. Mr. Alexander McDougall has 1,000 men constructing his peculiar whale-shaped ferry boats, turning out one every sixty days. The Chicago Shipbuilding Co., at Chicago, Ill., is building two steel steamers for the Minnesota Iron Co. The first is to carry 3,200 tons, with 16 feet draft of water. Besides the yards here noted there are others at Milwaukee, Sheboygan, Manitowoc, Grand Haven, etc., chiefly interested in wooden shipbuilding.—[American Engineer.

English Praise of American Machinery.

London Engineering notes the fact that the foreign demand for American textile machinery has been of late "more active than ever before," and that foreigners "are not slow to recognize the merits of same." "In the case of the American loom," it adds, "this is especially true, for it is generally thought that, for speed and good workmanship combined, it is superior to all in foreign rivals. As a result, it is being gradually introduced in many English factories, where practical test has clearly demonstrated its uses. In the United States, the ring-spinning frames are largely taking the places of mules in many of the mills, and they are now beginning to force themselves upon the attention of foreign manufacturers, who, though slow to adopt new methods, and conservative in the extreme, cannot afford to neglect any improvements, from whatever source they may come, which will give them any advantage, however slight, over their competitors. The same is true with regard to many other machines used in the textile industry, in which the inventive genius of the New World has suggested valuable improvements over existing methods, and which are certain to come to the front in foreign countries as soon as their value is appreciated. During the past twelve months the value of cotton and woolen machinery exported from Boston alone has amounted to nearly $325,000, which shows an increase of almost $100,000 in comparison with the year previous."

A Big Tree and a Big Saw.

The Chicago papers state that Neal Girard Van Doornum, of Cramers, Cal., is making preparations to take out a section of a big redwood tree, for the purpose of exhibition at the World's Fair in 1893. This will be the largest section of any big tree ever taken from California. The tree measures 99 feet in circumference, making it almost 33 feet in diameter. The section to be taken out will be 9 feet in height and 60 feet in circumference. It will be divided into three cuts. The World's Fair big tree is to be taken from Mammoth Forest, Tulare County, Cal., which is located 52 miles east of Tulare City, at an altitude of 6,325 feet above the level of the sea. The work of felling the tree has already begun. Ten skilled workmen have been engaged and are busy at work. The saw to be used in getting out these sections is 22 feet in length, and was made to order by the Pacific Saw Co., of San Francisco. It is said to be the largest crosscut saw ever made of one piece of steel, and is supposed to require eight men to handle. It will take ten men at least two months to complete all the work to be done. Three flat cars will be necessary for transportation, as the total weight will not be less than 65,000 pounds.

THERE are about 54,000,000 square miles of land on the globe, of which Europe has 4,000,000, America 16,000,000, Asia 19,000,000, Africa 12,000,000, and Australia and the rest 3,000,000.

THE SIMMERLY DERRICK.

The Simmerly Derrick Co., 97-101 Centre street, Cleveland, O., are the manufacturers of a derrick for the handling of ore and coal, herewith shown, for which they claim the following points of superiority:

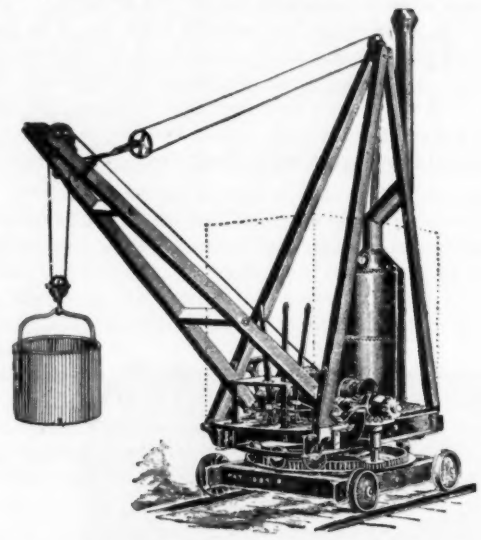
1st. It is built in the most substantial manner, of iron and steel, well knowing the severe work required of it.

2d. A special feature of the Simmerly derrick is that the engine and hoisting machinery are firmly bolted to a solid iron bed plate, insuring against any racking or getting out of line, and being independent of the carriage, overcomes any unevenness in or settling of the dock.

3d. The Simmerly derrick is equipped with either single or double engine (as may be desired) with 9x12 cylinder, of the most approved pattern, steam pump, boiler, etc., complete.

4th. Its simplicity in operating, as the hoisting, stopping and lowering movements are all accomplished with one lever.

5th. The absolute safety in operating, as the hoisting and rotating gear has 216 square inches of friction surface, which, with the combined clutch and



rake band (secured by letters-patent) are so constructed that so far as strength s necessary, a boy can operate it with ease.

6th. The capacity of the derrick is at the will of the engineer, being from 600 tons to 1,000 tons of coal per day of 10 hours, according to his skill.

The manufacturers say that their derrick is built for use, and the capacity of the machine, in connection with its durability, makes it an economical investment for any one requiring its services. They also build iron buckets and cars of the latest pattern, with automatic movement for dumping, and conveying ore and coal, in connection with this or any other derrick.

HOW STEEL TIRES ARE MADE.

Angus Sinclair, in a description of the Latrobe (Pa.) Steel Tire Works, says in the *National Car and Locomotive Builder:*

The melting of the metal that makes mild or open-hearth steel is done in a Siemens regenerative furnace. The furnace is built of fire-brick, and has a rounded hearth which is covered with a refractory sand that saves the brick from rapid destruction by the heat. On this hearth a charge of pig iron is laid, which forms the bath into which the other mixtures are thrown. When the calculated quantity of pig iron is put in, the gas is turned on and supplied with the air necessary for effecting perfect combustion. The resulting flame "reverberates" over the metal and soon melts it. A curious sight is to watch the iron succumbing to the penetrating power of the hot gases. The edges of the lumps soften first, and they begin to run like the sharp points of grease exposed to a hot sun, and the physical travail of metal is reflected by a glaring light that rivals in penetrating power an accumulation of arc lights. Gradually the whole mass dissolves amid much turmoil, and then the whole bath boils like a huge caldron of water. Great bubbles work up through the mass like steam rising to the surface of a boiler.

By this boiling process the excess of carbon present in the cast iron is burned out, and the men controlling the operations can tell pretty closely by the reduced violence of the ebullition how much carbon remains in the mixture. Puddled iron, scrap steel and other material thrown into the cast iron bath quickly melt and become a part of the charge. After the flame passes over the molten metal on its way to the chimney, it passes into a mass of honeycomb-like brick work, which absorbs the greater portion of the heat remaining in the gases. The inlet and outlet to the furnaces are so arranged that the direction of the incoming gas and air can be changed. As soon as the brick work gets highly heated, the gases going toward the furnace are passed through it, and the heat that would be wasted but for this arrangement is used to raise the temperature of the incoming gases. This is the "regenerative" principle.

When the mixture in the furnace has boiled to the point where the expert in charge considers the metal in proper condition for pouring, three or more small test ingots are poured. These ingots are sent to the tests department and subjected to very careful chemical and physical examination, which is kept on record, and the fate of each charge depends upon the report of its quality. Sometimes a charge may be too high or too low in hardening elements, and for that cause has to be rejected; but mistakes of this kind are very rare, for the men employed to supervise the operation are all experienced and skillful steel makers. The charge is then run into ingot molds, the size of the mold being regulated by the size of tire the ingots are required for. A steel ingot looks in shape like a monster cake of charlotte russe.

They have a peculiar method of pouring the ingots in these works which is different from anything which I have seen elsewhere. The common plan is to set the ingot molds open end up like so many cheese boxes and pour in the metal. Here the molds are set on a plate with the open end down. On one part of the plate stands an open pipe like the stand pipe in a locomotive dome but lined with fire clay. Smaller clay pipes lead from the base of this stand pipe to the mouths of the molds. The molten metal is poured into the stand pipe and passing through the various smaller pipes fills the molds by an upward flow. This practice is said to produce an ingot that is much more exempt from blow holes than those poured downward.

When the laboratory reports announce that the charge is satisfactory, the ingots are weighed and marked. They are then matched for weight to suit the future tires, and taken to the rolling mill. Here they are first placed in a heating furnace. This furnace is of peculiar construction. It has a sloping floor thirty feet long. The furnace at the upper part where the ingots are put in is comparatively cool. The ingots are gradually worked forward to the point where the heat is most intense. By this means the ingot is heated gradually and cracking is prevented. The heating furnaces are very conveniently arranged flanking two steam hammers that perform the next operations on the blooms. The heated blooms are handled by a most ingenious machine called for want of a better name a "gripping crane." This machine, which consists of an arrangement of horizontal levers and embracing jaws, performs in a Herculean manner the functions of a human arm and hand. The mechanism is operated by hydraulic cylinders, and the apparatus is capable of movement in every direction. It swings round a large circle and the hand part grasps an ingot and carries it round to the anvil of the great hammer, where it is deposited with careful nicety. This 20 ton hammer then imparts a few blows to the hot ingot, turning it into the shape of a flattened cheese. The hand of the gripping crane then takes a punch out of a rack and places it in the middle of the ingot when the hammer descends and drives out a hole that in future operations is enlarged to become the inside of the tire. After the punch is returned to its place and several other operations performed, the gripping crane takes the ingot, which is now a "blank," and hangs it on a monster horn attached to the anvil of a smaller steam hammer. The blank is revolved on a horn, and all the while the hammer keeps striking blows obliquely upon the outside edge of the blank. This bevels the periphery of the blank and begins the formation of the flange. The hammering which the blank receives here and under the heavier hammer is for the two-fold purpose of bringing the metal toward the form of a tire and for making the steel more compact. There is so much mechanical work converted into heat and transferred to the metal by the blows of the hammers that the blank is said to be hotter when the hammering is finished than it was when the ingot was taken out of the furnace.

When the blank leaves the small 7-ton hammer, it has assumed the form of a big ring. This is next taken to another heating furnace and heated for the rolling mill. This rolling mill is different from any machine used for tire making, and is a surprisingly ingenious apparatus for effecting the purpose of its design. It is the invention of Mr. Julian Kennedy, consulting engineer for the company, who has displayed a great constructive ability in the production of a machine that performs with wonderful accuracy a succession of complex operations that can be reproduced indefinitely in endless succession. The mill is formed of a combination of rolls that grasp the blank and compress it in every direction while rolling it into the required shape. The principal rolls stand in a vertical position, and hold the former which gives the tire the required shape. This, of course, acts on the outside of the tire. Another vertical roll set inside the tire pushes it toward the former. Horizontal rolls grasp the sides of the tire and keep them at the proper size. Hydraulic cylinders provide the power that acts on the rolls to make them squeeze the tire. When the tire is placed in position and the machine started, an enormous pressure is put upon the metal as it is worked into shape, and the production of a particularly solid tire is the result. There are many refinements of design in the rolling mill which want of space prevents me from mentioning. They will be readily appreciated by any mechanics who may visit the establishment. The blank is put into the mill at a yellow heat, and it is worked under a pressure of about 2,000 pounds to the square inch until it falls to a dull red heat, at which low temperature it is finished. The visitor is struck with the painstaking care devoted to the minutest detail of tire rolling.

From the mill the tire goes to the inspection department, where a very thorough search is made for defects that might shorten its period of service. None of these being found, it is sent to the machine shop to be bored out, and thence to the storage department to be ready for shipment. The greater part of the railroad companies require the tires to be bored out before delivery.

Traffic of the Suez Canal.

The *Railway Review* says: "The receipts of the Suez canal show a falling off for the first half of the present year, as compared with the corresponding period of 1889, of £60,800. It should be stated, however, that the receipts for last year were much heavier than for any previous year since the opening of the canal, and that the receipts for the present year, as compared with the corresponding period of 1888, shows an increase of £20,726, the total amount received being £1,362,400 for the six months."

GOLD may said to be everlasting and indestructible. The pure acids have no effect upon it. Air and water alike are unable to work its destruction. Days, years, century upon century may roll by; mighty empires rise and fall; dynasties which dream their power everlasting and armies which have marched and conquered may become nerveless; cities teeming with millions may become the abode of owls, yet the thin filament of gold remains to day as it was 5,000 years ago.—[Ex.

HINTS ON SHOP BUILDING.

BY B. F. SPALDING.

An eminent manufacturer who had already very extensive shops, determined to triple their capacity, and devoted considerable study and attention to the best methods of doing so. He called to his aid assistants who were familiar with all the manufacturing details and wants of his business, and with them, went over the advantages which were to be derived from setting this machine here, and that one there; so that the work would flow in a regular current like a river, and not be "damned like a dull canal with locks and chains." They went on to contrive and devise how the work should take its course, from one machine to the other, and how the outlines of the bui'ding should conform to the scheme, when amid all these beautiful plans and courses, as intricate and infinite as the stellar movements in the siderial heavens, he perceived the great fundamental truth to be that after getting under shelter the three things, light, air and space, all other things necessary to perfect the construction could be taken almost separately into consideration. This simplified the grand complication; the corrugations of his brow were smoothed out, and the great shops built, in accordance with this idea, gave undoubtedly greater and more enduring satisfaction than if they had been contrived with especial reference to the works which was, just then, to be built in them.

By a proper arrangement of machinery in shops, there is unquestionably much to be gained, but this might often be gained by resetting the machinery in the old shop. It shows off, when the new shop is fitted up, because the necessity has come for removal, and this has stimulated thought on the subject, which before was dormant. I knew a manufacturer to wake up one morning in an unaccountable manner, and order a change in the position of a machine which had stood in its place for five years, without a murmur. It was moved about 20 feet, and every day afterwards, saved the carrying of some 300 pieces back and forth, that same 20 feet.

When any one makes up his mind to build, he generally has some idea of his own about what he wants, and no one can be of much assistance to him in regard to the principal object of his undertaking. Still there are some things which, albeit they are of small importance, may well be borne in mind. Some of these are frequently pointed out; others but rarely mentioned, and it seems almost superfluous to devote any remarks to them.

But the construction of the buildings by a manufacturing concern, for the purpose of carrying on its business, is not an every-day occurrence; neither is it desirable that it should be, for it is accompanied with too much expense. It is not every firm that can go on as Krupp has at Essen, or as Pullman has in his model town, still increasing and piling on to his nucleus. Like other things, which may eventually exhibit great vitality, a permanent business may be of slow growth, and increase to great proportions from a small beginning. It is wise, then, as far as may be, to provide at first, for such contingencies. It is of prime importance to secure space in which to grow. This is not always possible in crowded cities, and ample accommodations can only be had by removals; but in the present hungry avidity with which industrial enterprises are sought by parties, who desire their presence in order to enhance the value of adjacent lands, there is plenty of chance to secure abundant space, to put buildings on, in situations where connections can be readily secured with the great highways of land and water transportation.

The expense of transportation is an item in the cost of a product. It is said that a turbine wheel may be set with equal advantage at either end of a conduit, because the force of the current, passing through, is the same in one place as another, although the lower end would appear to be the best, to the casual observer, because the full weight of the water comes there; so a manufactory may be situated with equal advantages at any point on the route which the raw material takes from the place of its origin to the point where it is laid down to the consumer as a finished product, though to the casual observer, the place where the raw material is procured appears the best, because the waste is then stripped off at the outset, and does not pay freight. This idea is being worked upon by the establishment of cotton mills at the South.

When a locality is chosen it is often a matter of economy to perfect the transportation facilities at once, in order to use them in bringing the materials of construction upon the ground. This plan saves expense in haulage. It has the further advantage that it will develop any defects in the system which may then be remedied before they interfere with the business.

The direction in which the main buildings run is of some importance as regards the direction in which the sunlight will enter it. The fact that if they run east and west the light will shine in at the south side all day long may be considered, and also the further fact that wings running out from the main building, whatever may be its height, if put out on the south side will not be shaded by the main building, but if on the north side they will be greatly darkened from this cause. If, however, the opposing walls of wings run out on the north side are well whitened, the evil will be in some measure corrected by the subreflection of a fair amount of light durlng a part of the day. The practice of putting buildings too near together in this great expanse of country, and getting them in the way of each other's air and light does not appear to be advisable.

The objection to buildings running north and and south is that unless very high roomed they are lighted and darkened from alternate sides. his keeps the accommodating muscles of the eyes in exercise, but is not as advantageous to doing work which requires frequent and careful observation, as the more uniform and steady light coming from a northern or southern exposure.

Wide shops should be high, if they are lighted from the sides, and even if lighted from above it is necessary to have light in order to permit a general and generous diffusion of the rays of light. If ample provision is made for the admission of light and air, there is this much to be said in favor of shops of broad area, that machinery can be arranged in them so that it will be disposed in the best possible manner for promoting and expediting the progress of manufacture.

Numerous divisions of manufacturing space into rooms, although quite cozy and comfortable, are not always as desirable as they appear. The custom seems to have grown of itself, and not to be founded upon good and sufficient reasons. Partitions shut off the light and occupy space where tools might be.

The space for any tool is wherever it can do its work on the material without carrying it out of its course, even if this necessitates setting an electric welding machine into a wood room amid flying shavings. Farmers will not go on their hay mows with matches in their pockets, but in street car stables the open gas lights flicker within two feet of the hay. The present idea appears to overcome all obstacles and set tools where they appear to be needed. It is said there is a blacksmith shop somewhere "out West" where six trip hammers are running up in the fourth story. For aught I know the cellar may be occupied for a powder magazine, and the other rooms for a match factory and insurance office. Narrow rooms may suffice for the work which is just at the moment in sight, but wide rooms will accommodate anything that the future may present, and allow the best possible disposition of the machinery.

Along in the "forties," when there was considerable excitement about this world's coming to an end, there was in a certain village in Massachusetts an ardent disciple of William Miller, who being well off, built a tabernacle for his brethren, but after the excitement subsided he altered it into a double tenement house. Some one who was surprised at the facility with which the change had been effected, exclaimed to the owner: "Why, it couldn't be any better if it had been designed for the purpose!" "Well, I did think that it might possibly have to be used in this way when I built it," was the candid reply.

This shrewd forethought and calculation is not misplaced in erecting shops. There has been many a large shop left standing idle, which would have been filled with life and business, if its projectors had been wise enough to design it in such a manner that if, at any time, it was not needed for a large single business, it could be partitioned off in suitable divisions for carrying on a number of smaller industries. "O," says one, "I am not building shops for other people, I'm building them for myself." That is right, and at the same time, perhaps, with a little judicious calculation, they may be designed in such a manner as to meet any contingencies which may arise. "Farming seems to be a kind of a lottery business," I said to an agriculturist, "if a number of uncertain things take place, you draw a prize, and if not, you draw a blank." "Yes," he replied, "and I should like to have you point out to me any kind of business that is not a lottery." It is this uncertainty which makes it good policy to prepare for any event which is liable to occur.

Sometimes long buildings are erected with only one or two doors in the whole length, but if the interior is unobstructed by permanent fixtures, glazed doors, at short intervals, answer the purpose of windows and have some advantages over them. The distance from a point outside of a building, to a point inside, must be measured along the path which must be traversed to go from one point to the other and material to be delivered may, for lack of a passage way, have to be carried half the length of the shop on the outside and back again on the inside when a door would have admitted at once. In hot summer days, doors admit lower currents of air, which keep the workmen comfortable, while if the air only comes in at the windows, the lower air is close and confined like that in a sweat-box.

Good, hard, level flooring is a very essential requisite in a shop for the movement of trucks. Two-inch oak plank laid on joists above damp ground cannot be depended upon for much more than seven years if there is but little circulation of air beneath. Efficient ventilation or imbedding the flooring in mortar to exclude the air secures durability.

The use of paper for temporary roofing has become quite common and seems to give satisfaction. Gravel roofs are good if kept in repair. They should not be of so broad area as to be subjected to the flow of great quantities of water, nor so steep as to have to resist swift currents which are liable to loosen up and wash off the gravel. Sheet iron roofs, if kept well painted, are very enduring. They will not be at all affected by corroding gases from below if they are protected by the interposition of paper.

It has for some years been a mooted question whether the use of water or of steam power was in all respects the most economical; and it appeared at one time that steam had the best of the argument, but the electric dynamo comes in now as a factor, and there appears to be some vitality yet left in hydraulics, but complaints against the uncertainty of water power come louder and louder every year. It is liable to fail just at the time when it is most needed; its supply is beyond man's control, while steam is entirely subservient and can be had at any time and in any quantity. Whatever power is used, the suggestion appears to merit consideration, that the motive power should be applied near the center of greatest resistance, as the shafting can then be decreased in size as it recedes, without being in danger from excessive torsion, which tends to distort it and create friction in the bearings.—[Age of Steel.

A Little Prophecy Verified.

A very agreeable prophecy respecting the iron trade appeared in the issue of the Cleveland (Ohio) *Iron Trade Review* for July 31, which we trust will materialize accordingly: "We venture to predict that the coming ten days will witness a much livelier iron market at all Southern and Western points. As indices of this better state of affairs we note a general inquiry for fall delivery, and more active operations at that centre of industry, Pittsburgh, after a reign of semi-idleness. This movement will probably be followed by buying in the West, though prices will not advance materially at the present moment. The chief features of the sales will probably be extended deliveries, and parties are now in the market for shipments running through the first six months of next year, and sales are reported to have been made on this basis by the leading companies South." Our market reports, printed to-day, indicate conditions tending to this result.—[Chicago Journal of Commerce.

INDUSTRIAL SUMMARY.

New Enterprises :—

The Blacksburg (S. C.) Machine & Iron Works will erect plant. Capital stock, $10,000.

The Youngstown Iron & Steel Co., of Youngstown, O., has been incorporated with a capital stock of $600,000.

It is stated that G. O. Ide is organizing the Chattanooga (Tenn.) Oil Stove Co. to manufacture a patent oil-heating stove.

The Self-acting Bell Co., of Lancaster, Pa., has been chartered, with a capital of $20,000. Self-acting electric bells and shelf hardware will be manufactured.

The McGuire Machinery Co., Chicago, has been incorporated, to manufacture machinery; capital, $22,000; incorporators, H. McGuire, O. P. Hurford, John Hoinsen.

The Hooker Steam Pump Co. has been incorporated at Chicago; for manufacturing pumps and other machinery; capital, $21,000; incorporators, William Hooker, William Vart, Henry C. Tulley.

Oliver King & Sons, of West Cleveland, O., are about to open a new shop for the manufacture of axes of all kinds. They will make a specialty of King's patent axe. The works will have capacity of 50 dozen per day.

The Henrici & Sibley Manufacturing Co. has been formed at Kittery, Me., to manufacture laundry machinery. The officers are: President, Charles Z. Bassett, of Chelsea, Mass.; Treasurer, Edwin E. Sibley, of Chelsea, Mass.

A new concern for the manufacture of wire goods has been established at Wheeling, W. Va., by W. B. Allison. The concern does not make any particular line of goods but makes a specialty of manufacturing wire novelties to order.

It is reported that a company is being organized by capitalists interested in the Norfolk & Western railroad to build a basic steel plant, at Salem, Va. This is in addition to the McCarty steel plant to be built at Salem, and upon which it is understood work is to be commenced shortly.

The Pittsfield (Mass.) Electric Co. has been incorporated with a capital of $100,000 in $100 shares, and with President, Alexander Kennedy; Treasurer, William A. Whittlesey; William Stanley, Jr., James W. Hall, William R. Plunkett, William L. Adam and Charles E. Merrill, as directors.

R. S. Crawford, representing a bicycle manufacturing concern in Washington, D. C., has been in Springfield, Mass., looking over a number of sites suitable for the location in that place. If it is decided to locate, a factory about 100x150 feet, three stories high, will be erected, and fully 100 men employed at the start.

The Cincinnati, Covington & Rosedale Electric Street Railroad have organized, and made application for right of way, this work will be pushed rapidly to completion. Their electrical contracts have not been let. The officers are: Henry Feltman, President, and O. J. Wiggins, Secretary, of Covington, Ky.

A steel plant, it is reported, has just been located at Jacksonville, twelve miles north of Anniston, which, when complete, will employ 3,100 hands. It is placed by an Eastern syndicate at the cost of $3,000,000. The product of the plant will all be worked up by the same company in other plants, located and used for that purpose.

The stock company recently organized by Leon Dodson, Jr., of Philadelphia and others, has been incorporated as the North Greensboro (N. C.) Rolling Mills & Improvement Co., by J. Cox, Jr., and D. S. Cresswell, of Philadelphia, Pa; J. E. Boyd and others. It is stated that it will build rolling mills on the Kirkpatrick property.

The Electric Engineering Co. has filed articles of incorporation in the Camden (N. J.) county clerk's office. The objects are to construct electrical railways, cars, etc. Harvey Barton, Henry Gianella, Christian Schneider and Thomas Marion, of Philadelphia, and Charles Richter, of Camden, are the incorporators. The capital stock is $100,000, of which $5,000 is paid.

Enlargements, Additions, Removals, Etc.:—

The Chapman Valve Co., at Indian Orchard, Mass., are making an extensive enlargement of their works.

The Michigan Malleable Iron Co., of Detroit, Mich., has added a foundry 250x65 feet to their already extensive plant.

The foundry of Landus, Frary & Clark, at New Britain, Conn., is being improved by the addition of a new cupola to the plant.

The Maris Machine Co., Philadelphia, Pa., have removed from 146 Broad St. to 2343-5 Callowhill St., where they have largely increased their facilities by more room and new machinery, tools, etc.

The Minnesota Iron Co. are building a new machine shop at Tower, Minn. The machine department will be 80x40 feet; the blacksmith department, 60x45 feet, and the carpenter department, 72x45 feet, with solid fire walls separating them.

The Lawrence Rolling Mill, at Ironton, O., will shortly be removed to Glasgow, Va., where it will be operated by the Glasgow Rolling Mill Co. The company will have a capital stock of $200,000. George T. Scott, of Ironton, is President of the new company.

The Pratt & Cady Co., at Hartford, Conn., are erecting a new foundry. The building will be 250x75 feet, and will have a traveling crane run the entire length of the building, besides a large number of jib cranes scattered throughout the wings, all of these cranes to be operated by electricity.

The Bishop & Babcock Co., of Cleveland, is erecting a new factory for the manufacture of brass goods and nails. The buildings will include one brick house, 300x50 feet in size and one story high, one building 200x50 feet and two stories high, and two smaller houses each 135x40 feet in size. The total cost will be $26,000.

The Sharon Iron Co., operating the largest iron plant in Sharon, has been reorganized, and will be known hereafter as the Sharon Iron Co., Limited. The capital stock is $1,000,000, all paid up, in 10,000 shares of $100 each. C. H. Buhl, of Detroit, is Chairman of the new company; F. H. Buhl, of Sharon, Treasurer, and David Adams, of that town, Secretary. The management is the same as formerly. During the past year $100,000 has been expended in improving the plant.

Furnaces and Works Starting Up :—

The new machine shop of Logan Bros., Oil City, Pa., commenced operations this week.

The steel plant at the Bellaire Nail Works resumed operations August 4th, after being closed for repairs for two months.

The South Mountain Iron & Mining Co.'s Pine Grove Furnace has put in a new hearth, crucible and bath, and blew in on the 23d inst.

Hecla Furnace, of the Hecla Iron & Mining Co., at Ironton, O., which has been undergoing repairs for some time, was put in blast last week.

The plant of the Franklin Iron Works, at Rorherstown, Lancaster County, Pa., which has been idle for some years, was put in operation on the 29th ult. The plant is a small one and makes about 400 tons of merchant bar and muck iron annually.

Fires and Accidents :—

The plant of the Missouri Car & Foundry Co., located on Dorcas and De Kalb streets, St. Louis, Mo., was injured by fire on July 30th.

General Industrial Notes:—

The Columbia Rolling Mill Co., of Jersey City, N. J., desire to obtain the name of a manufacturer of a machine capable of tinning Taggers iron of Nos. 34, 36 and 38 gauge. It is specified that the tin must come out of the bath clear and without any lumps on the sheets.

The Walton Architectural Co., Cincinnati, O., report business very brisk with them. Their contracts have increased so much that they have been working night and day for three months. This is very encouraging and speaks well for the reputation they are making for doing good and reliable work.

Hollingsworth, McClure & Co., 234 West Pearl street, Cincinnati, O., manufacturers of ornamental brass goods of all kinds, report a good business and, up to this time, more orders than for the same time last year. They manufacture brass bedsteads and many other articles in brass, which are kept and sold by furniture dealers.

The Card Electric Motor & Dynamo Co., Cincinnati, O., have increased their capital stock one-half, which will increase their working capacity three times as much as it was when they started in the business. They are so crowded with orders that they are two months behind hand, but with the increase of facilities they expect to catch up.

The James L. Haven Co., manufacturers of elevators, hydraulic, steam and hand-power, 56 Plum St., Cincinnati, O, report that they have been doing a very large business in this line, and from January to July 1st this year have made and sold more elevators than in the whole of last year. This company manufacture many articles in the hardware line, and report a good business.

One of the huge stacks at the Ætna Mill, New Castle, was discovered to be in a dangerous condition the other day. It was nearly past its line of gravitation, and in its fall would undoubtedly have killed and injured a number of iron workers and laborers. Work on the two pipe mills was stopped, and the men were put to tearing down the stack.—[Youngstown (O) Telegram.

The Triumph Engine Co., Cincinnati, O., have thus far been doing a good business. They have shipped one of their engines to England. The other day several expert mechanics witnessed the working of one of these valveless engines, which has been built for the Cincinnati Electric Light & Gas Co. They were very much pleased with the result, as it was a complete success in every way.

The Saegendorph Iron Roofing Co., Cincinnati, O., report sales of one car load of roofing for Durango, Mexico; one car load of ceiling for South America, and one car load ceiling to Sydney, Australia, and that the business has been very good thus far for this season, and that they have facilities for doing a very much larger business. This, with other kinds of business, has been affected to some extent by the carpenters' strike and other troubles in some portions of the country.

The Cordesman Machine Co., of Cincinnati, O., have secured the contract for a complete outfit of machinery for the Dixie Wagon Co., of Fort Worth, Texas. This contract was awarded to this company after agents of the Dixie Wagon Co. had visited some of the largest wood-working machine establishments in other cities. This is quite a compliment to the Cordesman Machine Co., and speaks well for the reputation the company is making in turning out well-finished and reliable machinery.

We do not hear many complaints in these times of advancement that the wood-worker cannot secure time and labor saving machines to serve his special purposes. One to study their wants successfully is the Egan Co., of Cincinnati, O., who should be credited with their best efforts to reduce the cost of manufacture to the lowest point. Their late mechanisms of American ingenuity of every description for the working of wood are among the best, and are in heavy demand from this country and abroad.

The Herenden Manufacturing Co, Geneva, N. Y., sole makers of the Furman boiler, and dealers in radiators, pipes, fittings, etc., have just issued the 10th edition of their book on steam and hot water heating, also a lithographic hanger of the Furman boiler. Among the special claims made for this boiler are: Vertical circulation, which insures minimum friction and maximum velocity of the water. All joints are lathe turned, screw threads, iron to iron, no packing, no leakage. By the arrangement of the tubes the hottest part of the fire is next to the water leg, thus insuring economy of fuel. The catalogue and hanger will be mailed on application. They estimate, free of cost, on steam or hot water work in any part of the country.

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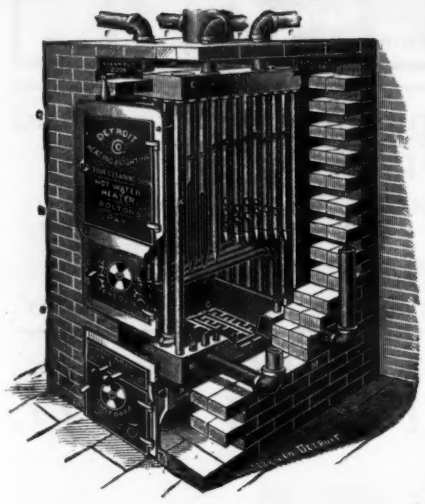

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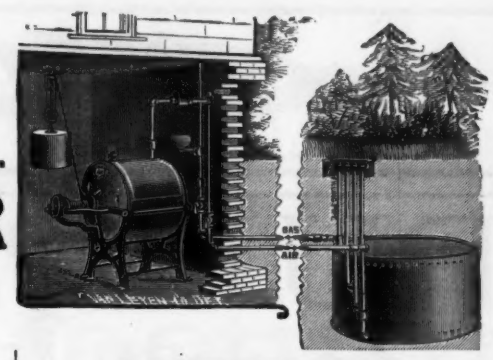

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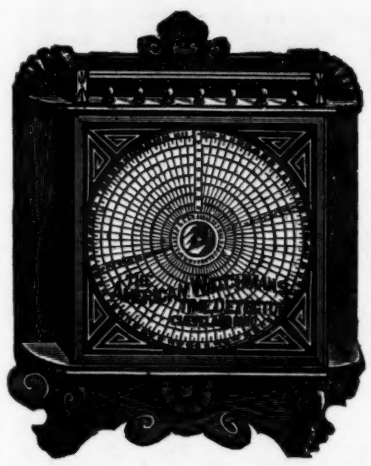

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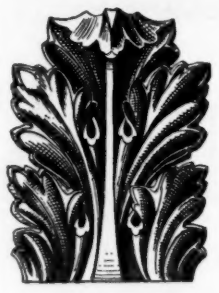

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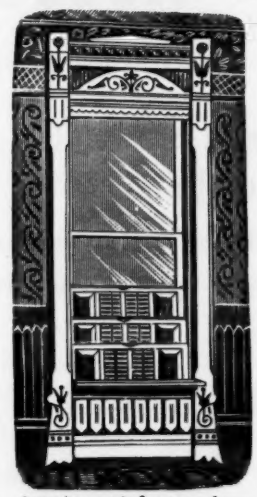

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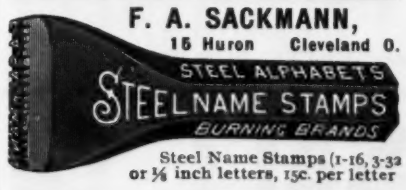

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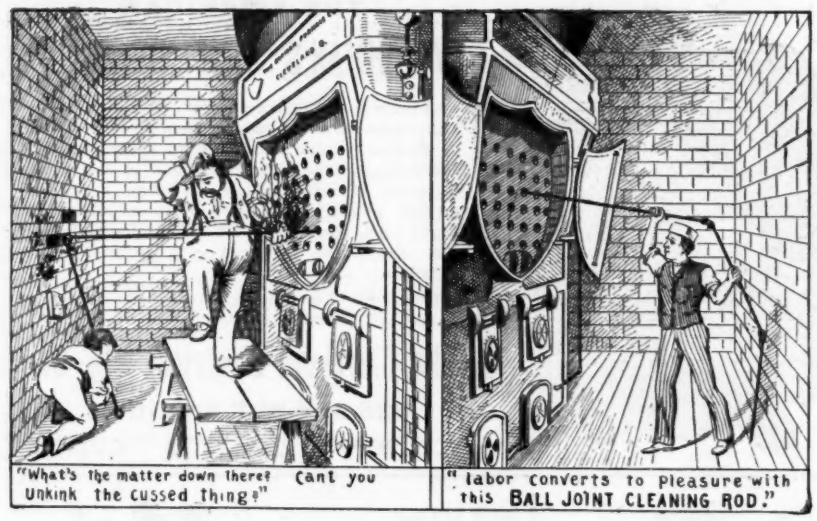
"What's the matter down there? Cant you Unkink the cussed thing?"
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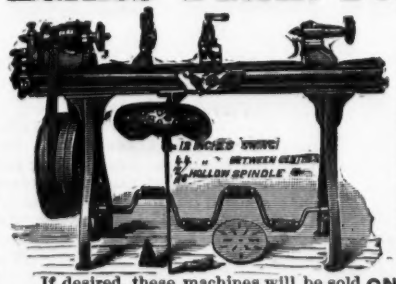

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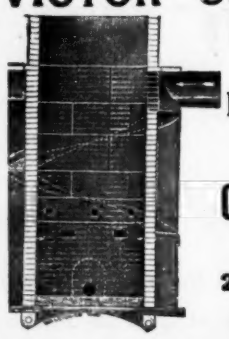

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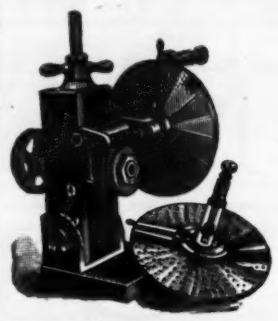

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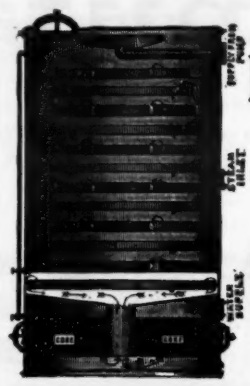

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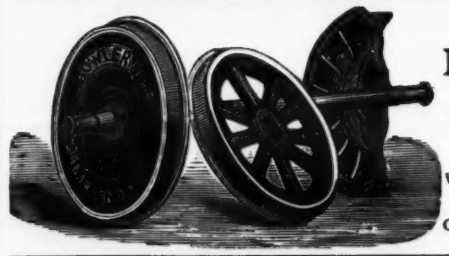

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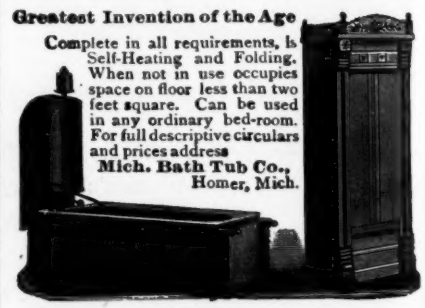

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Steam Jet Pumps,	From	$4.00 up.
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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 50 @17 00; Southern Coke No. 2 Foundry, $16 00 @16 50; Southern Coke No. 3 Foundry, $15 50 @16 00; Southern Coke No 1, Softeners, $16 00 @16 50; Southern Coke No. 2, Softeners, $15 00 @15 50; Ohio Silveries No. 1, $18 25@18 75; Ohio Silveries No. 2, $17 25@ 17 75; Ohio Strong Softeners No. 1, $19 00@19 50; Ohio Strong Softeners No. 2, $18 25@18 75; Lake Superior Charcoal Nos. 1 to 6, $19 50@20 50; Tennessee Charcoal No. 1, $19 50@20 00; Tennessee Charcoal No. 2, $19 00@19 50; Southern Standard Car Wheel, $22 00@24 00; Tennessee Standard Car Wheel, $19 50@20 50.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 50@16 00; Hanging Rock Coke, No. 1 foundry, $17 50@18 50; Jackson Co. Stone Coal, No. 1 foundry, $17 00@17 50; Tennessee Charcoal, No. 1 foundry, $17 50@18 00; Hanging Rock Charcoal, No. 1 foundry, $21 00 @22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 50@14 00; Standard Southern Coke, mottled, $13 00@13 50; Cold Short Southern Coke, grey forge, $13 00@13 50; Strong Ohio Neutral Coke, grey forge, $16 00@16 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $22 50@23 50; Tennessee Car Wheel, $20 50@21 50; Lake Superior Car Wheel, $21 50@22 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $18 25@18 50; Mahoning and Shenango Valley strong, No. 2 Foundry, $17 25 @17 50; Niagara No. 1, $00 00@00 00; Niagara No. 2, $00 00@00 00; Niagara No. 3, $00 00@00 00; Ohio Softener No. 1, $18 25@18 50; Ohio Softener No. 2, $17 25@17 25; Lake Superior Charcoal, $20 00@00 00; Tennessee Charcoal, $19 5 @00 00; Southern Softener No. 1, $16 75@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 75@00 00; Southern Strong No. 2 Foundry, $16 75@00 00; Alabama Car Wheel, $24 00@00 00; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@ 23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $16 25@16 50; Southern Coke No. 2, $15 25@15 50; Southern Coke No. 3, $14 75@15 00; Southern Grey Forge, $14 25@ 14 50; Southern Charcoal No. 1, $18 00@18 50; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $17 00@17 50; Missouri Charcoal No. 2, $16 25@16 75; Ohio Softeners, $18 00@ 19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $22 00@22 50; Southern, $19 00@ 22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

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LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@ 15 25; Southern Coke No. 2 Foundry $14 25@ 14 75; Southern Coke No. 3 Foundry $13 75@ 14 25; Grey Forge, $13 25@13 75; Southern Coke Silver Grey, $14 00@15 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 50@17 75; No. 2 Foundry, $16 50@16 75; Grey Forge, $15 50@15 75; White and Mottled, $14 50@14 75; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal $23 00 @29 00; Bessemer, $19 00@19 25.

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1¼ to 4 by ⅜ to 1 inch	1 90
4¼ to 6 by ⅜ to 1 inch	2 00
1¾ to 6 by 1¼ to 2 inch	2 30
1¼ & 1⅜ by ⅜ to ¾ inch	2 00
1 & 1¼ by ⅜ to ¾ inch	2 10
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 30

Round and Square.

1 to 1⅞ inch	1 90
2 to 2⅝ inch	2 10
2¾ to 3¼ inch	2 40
3⅜ to 4 inch	2 90
4⅛ to 4⅝ inch	3 40
4¾ to 5 inch	3 60

Oval.

⅜ to 1¼ inch	2 30
½ to ¾ inch	2 50
½	2 70
¾	3 10

Half Oval and Half Round.

1¼ to 3 inch	3 00
⅜ to 1¼ inch	2 60
½ to ¾ inch	3 20
½	3 40
¾	4 90

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 10
1 to 1¾ by ¼ and 5-16 inch	2 20
¼ to ⅜ by ¼ and 5-16 inch	2 40
½ to ¾ by ¼ and 5-16 inch	2 90

Hoops.

1¼ to 4, Nos. 13 to 15	2 70
1¼ to 2, Nos. 16 to 18	2 80
1¼ to 2, No. 19	2 90
1¼ to 2, No. 20	3 00
1¼ to 2, No. 21	3 10
1¼ to 2, No. 22	3 20
15-16, 1 and 1⅛, Nos. 13 to 15	2 90
15-16, 1 and 1⅛, Nos. 16 to 18	3 00
15-16, 1 and 1⅛, Nos. 19 and 20	3 10
15-16, 1 and 1⅛, No. 21	3 20
15-16, 1 and 1⅛, No. 22	3 30
⅞, Nos. 13 to 15	3 10
⅞, Nos. 16 to 18	3 20
⅞, Nos. 19 and 20	3 30
⅞, No. 21	3 40
⅞, No. 22	3 50
13-16, Nos. 13 to 15	3 30
13-16, Nos. 16 to 18	3 40
13-16, Nos. 19 and 20	3 50
13-16, No. 21	3 60
13-16, No. 22	3 70
¾, Nos. 13 to 15	3 40
¾, Nos. 16 to 18	3 60
¾, Nos. 19 and 20	3 70
¾, No. 21	3 80
¾, No. 22	3 90
11-16, Nos. 13 to 15	3 60
11-16, Nos. 16 to 18	3 80
11-16, Nos. 19 and 20	3 90
11-16, No. 21	4 00
11-16, No. 22	4 10
⅝, Nos. 13 to 15	3 90
⅝, Nos. 16 to 18	4 10
⅝, Nos. 19 and 20	4 20
⅝, No. 21	4 30
⅝, No. 22	4 40
⅝, No. 23	4 60

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 30
1¼ to 6 by Nos. 11 and 12	2 40
1 to 1¾ by ⅛ to 3-16 in	2 50
1 to 1¾ by Nos. 11 and 12	2 60
⅞ and 13-16 by ⅛ to 3-16 in	2 80
⅞ and 13-16 by Nos. 11 and 12	2 90
¾ and 11-16 by ⅛ to 3-16 in	3 10
¾ and 11-16 by Nos. 11 and 12	3 20
⅝ and 9-16 by ⅛ to 3-16 in	3 40
⅝ and 9-16 by Nos. 11 and 12	3 50
½ by ¾ to 3-16 in	3 70
½ by Nos. 11 and 12	3 80

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⅛ inch, beveled edge, by Nos. 11 and 12	2 90
⅛ inch, " " " 13 and 14	3 10
¼ inch, " " " 11 and 12	3 20
¼ inch, " " " 13 and 14	3 40

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No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

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Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
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⅜ to 11-16 and 4⅜	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

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	cts. ℔s
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
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Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	Net Tons
No. 1 R. R. wrought scrap	$19 50
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	13 50
Iron axles	22 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00

	Gross Tons
Old iron T rails	24 00
Old steel rails	19 50
Old car wheels	18 50
Old copper	℔ 10
No. 1 H. red Brass	11
Heavy yellow brass	8½
Light yellow brass	6
Scrap Zinc	
Tea Lead	
Heavy Lead	3¼

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SMOKE STACK AND GASOMETER RIVETS.
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J. H. OUTHWAITE & CO.,

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—AND—

- - PIG IRON

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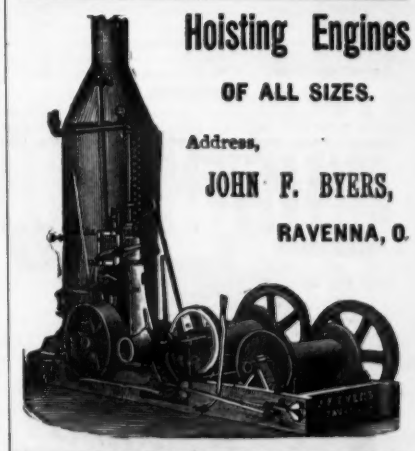

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INDIANA MACHINE WORKS

FORT WAYNE INDIANA

BUILDERS OF WOOD WORKING MACHINERY.

WRITE FOR DESCRIPTIVE CIRCULARS.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¾

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 50
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard .dis 60&10
Shultz Raw Hide Leather Belting, single.....dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¾@10¾

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill .....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills .....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, C. F.	F. F.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@5- &5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10
Industry File Works, hand cu'.....dis 50

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅛	11⅛	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Excelsior Rubber.....₩ lb [illegible]

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine)		11¼c
3-Ply " 1 lb Balls		12@12¼c
3-Ply " 1½ lb Balls		11@11¼c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

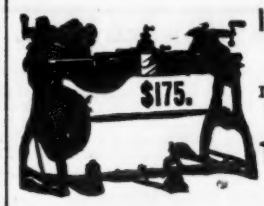
Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40



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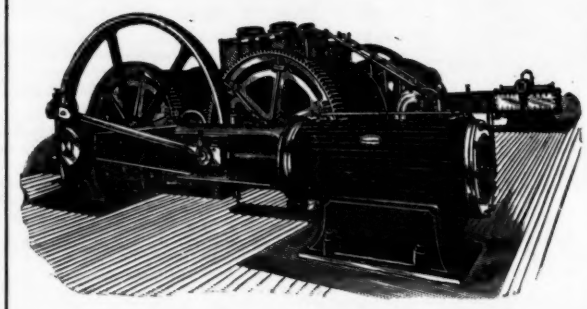

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MONARCH SEPARATOR.
Non-Bessemer converted into Bessemer ore upon a commercial scale, economical'y. Capacity fifteen tons per hour. Samples treated without charge. Correspondence solicited.
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LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS-SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
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CHAIN BELTING,

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For handling materials of all kinds.
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Standard Fiber-Ware.

Water, Dairy, Fire and Chamber Pails, Wash-Basins, Spittoons, Slop Jars, Mats, Etc., are
USED BY EVERYBODY
who knows its merits, because it is
Handsome, Cleanly, Durable,
and is made from Flax Fibre, in styles plain and decorated, white and colored, and is
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Who keep abreast with the times. None genuine without this trade-mark. See price list elsewhere. Send for catalogue, etc.

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HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 7c&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 7c&5

Chains.

Revised List.
Trace, 6½-10-2.....℔ pair 1.03 } .....50&10
Trace, 6½-10-3.....℔ pair .92 }
Trace, 7-10-2.....℔ pair 1.11 }
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 5½@6
Jack Chain, Iron.....dis 75@75&
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	. . .	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in.	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 25&10
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@¼...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

Squares.

Steel and iron, Nickel plated } .....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
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Tinned Swedes iron tacks.....dis 70&10@10
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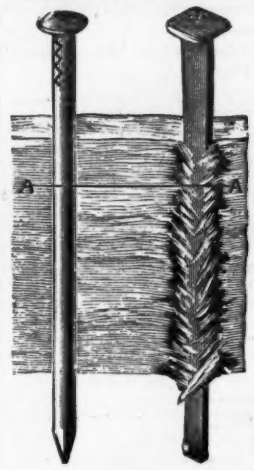

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75 h. p. Horizontal	800
20 h. p. Horizontal Side Crank	200
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50 h. p. Horizontal Balanced Side Crank	350
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10 h. p. Horizontal	125
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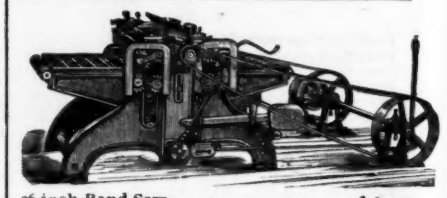

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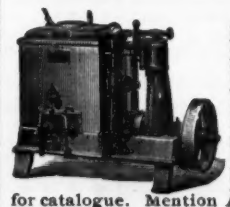

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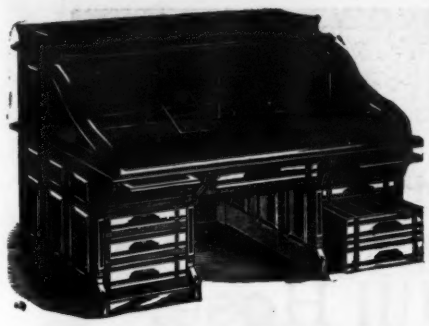

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Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
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*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

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FOR AKRON, CANTON AND MARIETTA.

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	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

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For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

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From Cleveland Union Station.

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	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

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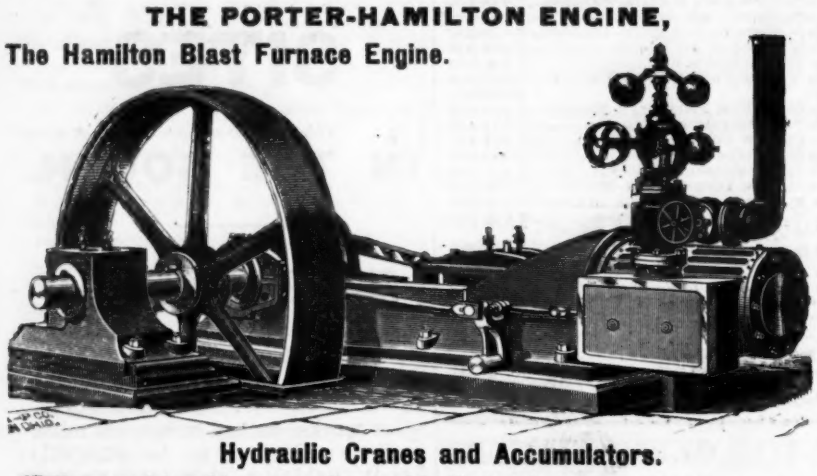

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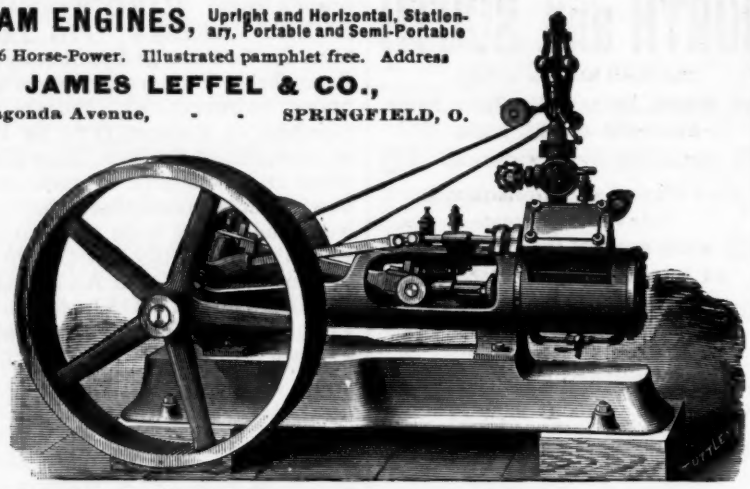

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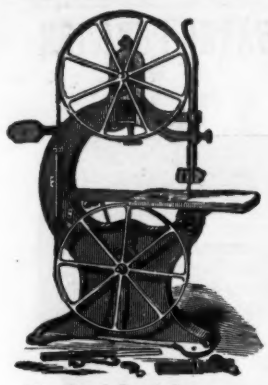

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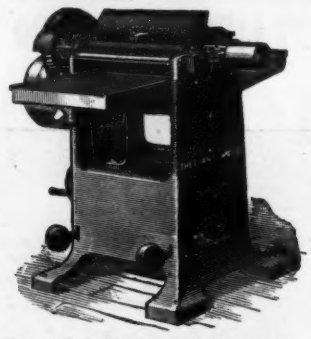

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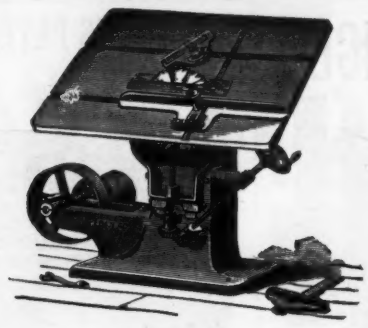

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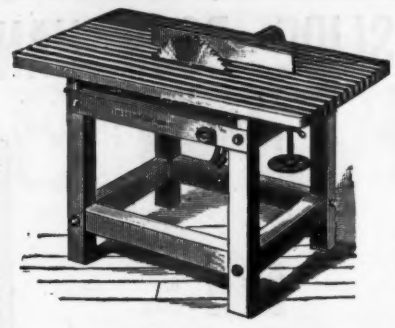

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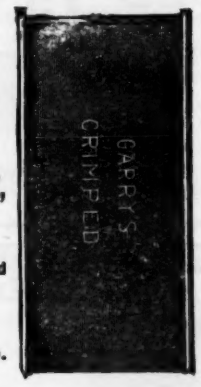

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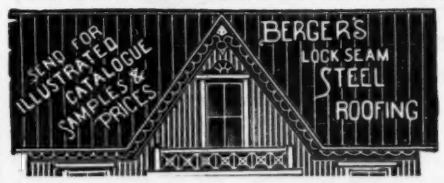

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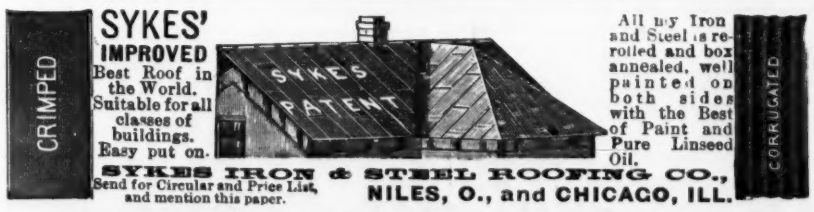
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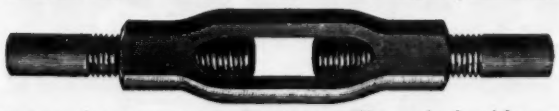

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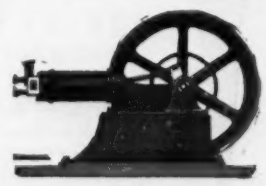

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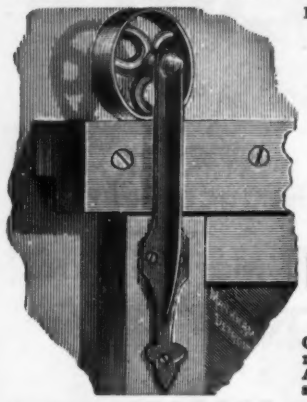

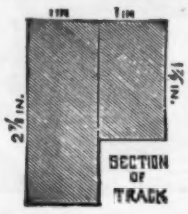

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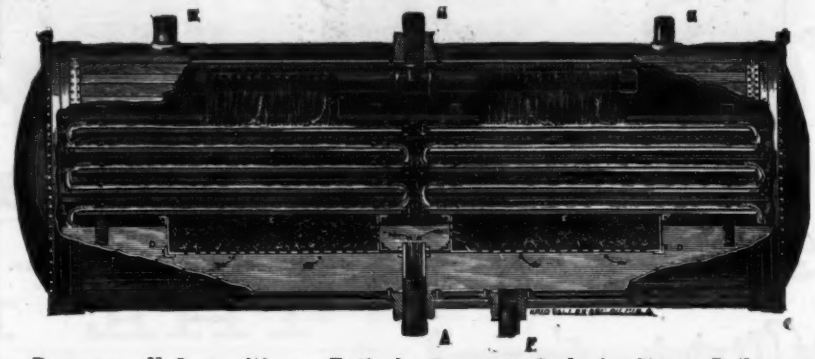

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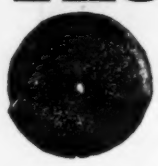

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